LIQUID ROCKET BOOSTER

PRELIMINARY

HAZARD ANALYSIS

FINAL REPORT

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MANNED SPACE SYSTEMS

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LIQUID ROCKET BOOSTER
PRELIMINARY HAZARD ANALYSIS
APPROACH

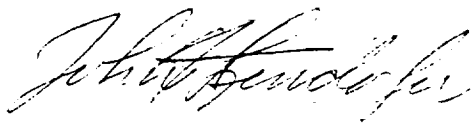
MANAGEMENT OVERVIEW

A preliminary hazard analysis (PHA) is an analysis of hazards which are to be eliminated from a system being designed. This document explains the approach taken by Martin Marietta Michoud Aerospace Safety and Health Department for the Liquid Rocket Booster PHA. It explains what the analysis is, how it is used, and why it is performed. It also explains how and why hazards, LRB subsystems, and life cycle phases are selected for consideration.

The text of this document also demonstrates and explains the methods of compliance with the requirements of NSTS 22254, Methodology for Conduct of NSTS Hazard Analyses; NHB 5300.4 (1D-2), Safety, Reliability, Maintainability and Quality Provisions for the Space Shuttle Program; SAMSO-STD-79-1, Integrated System Safety Program for the MX Weapons System; and Martin Marietta Standard Procedure 51.1.1, Hazard Analysis. The applicability of each of these requirements to the conduct of the PHA is examined and discussed.

The explanation provided is intended as a tutorial for engineers and other technical personnel who are not thoroughly familiar with the technical details of hazard analysis methods and techniques. For this reason, a detailed discussion of the thought processes involved in the selection and examination of hazards is presented in a manner which does not presuppose a working knowledge of systems safety engineering.

This documented is submitted in fulfillment of WBS 7.5.2 for the LRB Project.



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LIQUID ROCKET BOOSTER
PRELIMINARY HAZARD ANALYSIS
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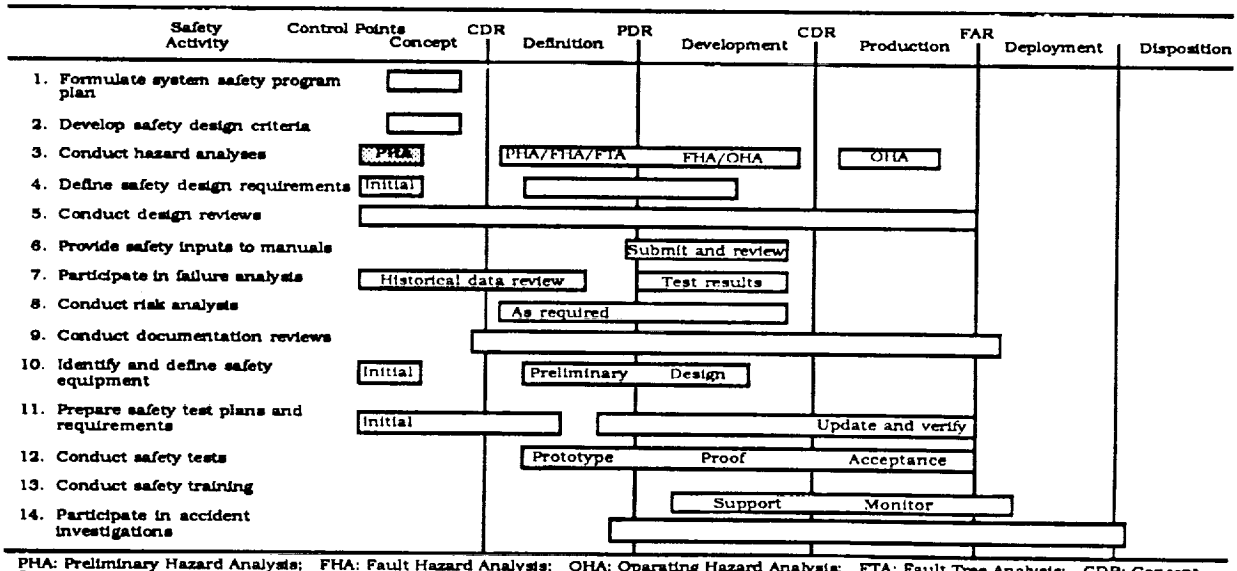
LIQUID ROCKET BOOSTER
PRELIMINARY HAZARD ANALYSIS
APPROACH

1. PURPOSE - This document explains the approach to be used to perform the preliminary hazard analysis (PHA) for the Liquid Rocket Booster (LRB). The PHA identifies safety-critical areas in the baseline and trade study concepts, identifies and evaluates potential hazards, and determines the initial safety design and operations requirements needed during the concept phase. The PHA will provide management with an understanding of potential risks during trade studies and program definition.

2. DESCRIPTION - A PHA is performed to document an initial risk assessment of a concept or system. It is based on the best available data, including mishap data from similar systems, and lessons learned from other programs. The hazards associated with the proposed design or function are identified and evaluated for potential severity, probability and time of exposure. Design controls and other actions needed to eliminate hazards or reduce the risk to an acceptable level are considered and documented. Proposed design controls are made available to the engineering organization for incorporation into the final design.

3. PROGRAM PHASE - The PHA effort is initiated during the initial concept phase of a program, as shown on the chart below, so that safety considerations are included in design alternatives and trade studies. It is also used as the baseline for performing future hazard analyses. Because the PHA is the first hazard analysis performed, it can be used to document what hazards, subsystems and mission phases were initially considered by the safety organization, and how the maturing design was influenced by safety considerations.



PHA: Preliminary Hazard Analysis; FHA: Fault Hazard Analysis; OHA: Operating Hazard Analysis; FTA: Fault Tree Analysis; CDR: Concept Design Review; PDR: Preliminary Design Review; CDR: Critical Design Review; FAR: Final Acceptance Review

NOTE - This diagram is from System Safety Engineering and Management by Harold E. Roland and Brian Moriarty, John Wiley & Sons, 1983 Used here under the provisions of Sections 107 and 108 of the United States Copyright Act of 1976.

4. HAZARDS - There is no universally accepted authoritative definition of precisely what constitutes a hazard. However, within the safety community a hazard is generally considered to be a condition which represents a threat or danger of causing harm. The following definition of a hazard is taken from System Safety Engineering and Management by Harold E. Roland and Brian Moriarty, which is a recognized reference:

> "A potential condition, or set of conditions, either internal and/or external to a system, product, facility, or operation, which, when activated by a stimulus, transforms the hazard into a real condition, or series of events which culminate in a loss (an accident)."

It should be noted that the hazard is not the loss, injury or accident itself. Fire, for example, is a hazard because it has the capability of causing injury, igniting other materials, or causing damage. But the injury or damage already caused by the fire is not a hazard; it is the potential effect of the hazard which has been made actual by the occurrence of an accident. In the discussion which follows, some hazards may appear to be more properly referred to as events, accidents or systems, than as conditions. In each case, however, the condition, event, accident or system referred to as a hazard is considered from the point of view of its potential to cause harm.

5. HAZARDS VERSUS FAILURES - For this reason, there is a fundamental difference between hazards and failures. A failure may be considered as an accident or an undesired event that has already occurred. From this point of view, a failure is not necessarily a hazard. However, a failure often represents a malfunction which, if not corrected or mitigated in some way, can cause further damage or injury. Therefore, most failures are hazards, and are taken into consideration in hazard analyses. However, not all hazards are failures, for the very presence of toxic substances, extreme temperatures, pyrotechnic devices and the like represent potential for doing harm, and as such are hazardous conditions in themselves. Where such hazards are considered to exist in the preliminary concepts, they are reported in the PHA.

6. THREE DIMENSIONAL HAZARD ANALYSIS - This document describes a computerized, systematic, comprehensive approach used successfully for the Aft Cargo Carrier PHA. This approach, referred to as a three dimensional hazard analysis, considers a list of candidate hazards as they pertain to each identified subsystem and each identified life cycle phase relative to the LRB. This technique provides assurance that all potential hazards are considered and, where actions to resolve them are required, that such actions are properly identified.

7. FORMAT - The format for a PHA is usually a columnar matrix as described in paragraph 3.1.4 of NSTS 22254, Methodology for Conduct of NSTS Hazard Analyses. However, the columnar format is difficult to read and is more difficult to add to or update. For this reason, the LRB PHA is recorded in a format compatible with section 6.0, "Hazard Reports" of NSTS 22254. This format is easier to read, is

readily stored as a data file and updated, and is the format required by MSFC for reporting of hazards. Each hazard report is prepared on a separate page, called a hazard analysis worksheet, or HAW. The following data are included:

a. Hazard Report Number - Each hazard report is identified by the letters "LRB P-" preceding a letter and three or four digits. Together, these characters uniquely identify each hazard report, and will be used in a data retrieval system to access and update the reports as necessary.

b. Analyst/Engineer Name - The name of the individual preparing the report will be indicated initially. If PHA reports are subsequently updated or modified by a different individual, that individual will be identified. Preliminary hazard analysis reports do not require additional concurrence or approval.

c. System - The systems identified for the LRB PHA are divided into the following catagories:

A - Avionics
B - Booster Separation System
C - Flight Crew
D - Parachutes and Recovery Aids
E - Electrical, Batteries and APU
F - Launch Facilities
G - LRB/Ground Interfaces
H - Hazardous Gas Detection System
I - LRB/ET Interfaces
J - ET and Components
K - Cryogenic Tanks and Systems
L - Liquid Injection System
M - Engines and Controllers
N - TVC Actuators and Subsystem
O - Orbiter, Subsystems and Payload
P - Propellants and Propulsion
Q - Crew Access Provisions
R - Range Safety System
S - Vehicle Structure & Material
T - Thermal Protection Subsystems
U - The Environment/The Public
V - Computer Systems & Software
W - Pressurization Subsystem
X - Personnel
Y - Controls and Displays
Z - Caution and Warning

d. Date - The date indicated is the date of the creation or the latest revision of the individual hazard analysis. This date is the only method of determining the most

recent or current revision of this report. Dates on individual pages may differ, indicating the different dates of creation or revision. Change of the indicated date will not necessarily indicate a change in the text of the analysis, since a new date (e.g., a submittal date) may be assigned to an existing analysis to indicate that the analysis is current on that date.

e. Title - The hazard title indicates the system, hazard and mission phase considered. This title is assigned from checklists by the computer, and may contain grammatical discrepancies. In all cases, however, the title is descriptive of the hazard under consideration, the system to which it applies, and the period or operation during which the hazard is assumed to exist.

f. Hazardous Condition - This is the condition which is to be eliminated, controlled or reduced to an acceptable level by the controls proposed in subsection j, Safety Requirements.

g. Hazard Cause - The hazard cause(s) are assumed from the baseline configuration under consideration. Subsequent configurations may be modified to eliminate the cause(s) by design.

h. Hazard Effect - This is the assumed mishap or accident for which the hazard under consideration is a necessary condition. The presence of the hazard does not necessarily lead to the hazard effect, but makes it possible. The effect listed is the immediate assumed result of the potential danger, represented by the hazard, being activated by one or more additional causes. In some cases, two or more effects are identified.

i. Hazard Level - Hazard levels are assigned in accordance with NSTS 22254, paragraph 6.2 i, as *catastrophic, critical* or *controlled.*

j. Safety Requirements - This paragraph is a short description of the proposed methods of controlling the hazardous condition to prevent the occurrence of the hazard effect(s).

k. Elimination/Control/Accepted Risk Rationale - This subsection identifies one or more of the requirements of NHB 5300.4 (1D-2), Safety, Reliability, Maintainability and Quality Provisions for the Space Shuttle Program, paragraph 1D201.6, which are implemented by the safety requirements, above, to eliminate the hazard or to reduce it to an acceptable level. These include: eliminated by design, minimized by design, provides appropriate safety devices, provides appropriate warning devices, institutes effective special procedures, and provides appropriate personal protective equipment.

l. Verification Methods - These are the means employed to verify that the controls described in the safety requirements are actually imposed. These include: manufacturing process plans, engineering analysis, proof test, functional test,

mandatory inspection points, receiving inspection, operation and maintenance instructions, STS flight rules, emergency plans and rehearsals, certificates of training completion, equipment issue records, and other methods. Because most of the identified hazards may be expected to be eliminated by design, verification of this elimination may include the proposed LRB concept or the end item specification.

m. Additional Requirements - The foregoing requirements exceed those for the PHA as contained in paragraph 3.1 of NSTS 22254. Additional requirements for hazard reports contained in paragraph 6.2 m through 6.2 w are not applicable to a PHA. One or more of these additional data elements may be supplied at a future time if the PHA is updated to a system or subsystem hazard analysis at a later date.

8. SYSTEM CONSIDERATION REQUIREMENTS - NHB 5300.4 (1D-2) requires in paragraph 1D201.5 that "consideration shall be given to at least the following elements:

a. Isolation of energy sources/propagation paths.

b. Cryogenics and Propellants: their characteristics, hazard levels, and quantity/distance constraints, handling, storage, and transportation safety features, compatibility factors, etc.

c. Proposed system environmental constraints.

d. Use of explosive devices and their hazard constraints.

e. Extra/intravehicular activities.

f. Effect of transient current, electromagnetic radiation and ionizing radiation.

g. Design of controls to prevent inadvertent activation of initiation circuits.

h. Crash worthiness and ditching.

i. Documentation for safe operation and maintenance of the system.

j. Training and certification pertaining to safe operation and maintenance of the system.

k. Egress, escape, rescue, survival, and salvage.

l. Life support requirements and their safety implications in manned systems.

m. Fire and explosion sources, detection, warning and protection.

n. Resistance to shock damage.

o. Toxicity sources: detection and warning.

p. Man-machine relationship.

q. System interactions.

r. Meteoroid penetration.

s. Docking considerations/Cargo handling.

t. Long-term storage."

9. REQUIREMENT/SYSTEM COMPARISONS - Compliance with NHB 5300.4 (1D-2) requires that each of the selected systems listed on page 3 be examined with respect to each of the considerations listed above. This examination indicates that some of the considerations listed pertain especially to certain systems. When examining these systems, these special considerations should be taken into account. A matrix showing this relationship is shown on the next page. A discussion of the relationships indicated by this matrix follows:

a. Obvious energy sources are the booster separation system, batteries, APU, cryogenic system, liquid injection system, engines, TVC actuation systems, propellants, the range safety system and pressurization subsystems. The hazardous gas detection system (HGDS) is intended to detect propellants in areas other than where intended, thus indicating a potential energy source which is not a normal condition. Propagation paths for energy sources include the electrical system for electrical energy, the propulsion system, and the vehicle structure for strain energy.

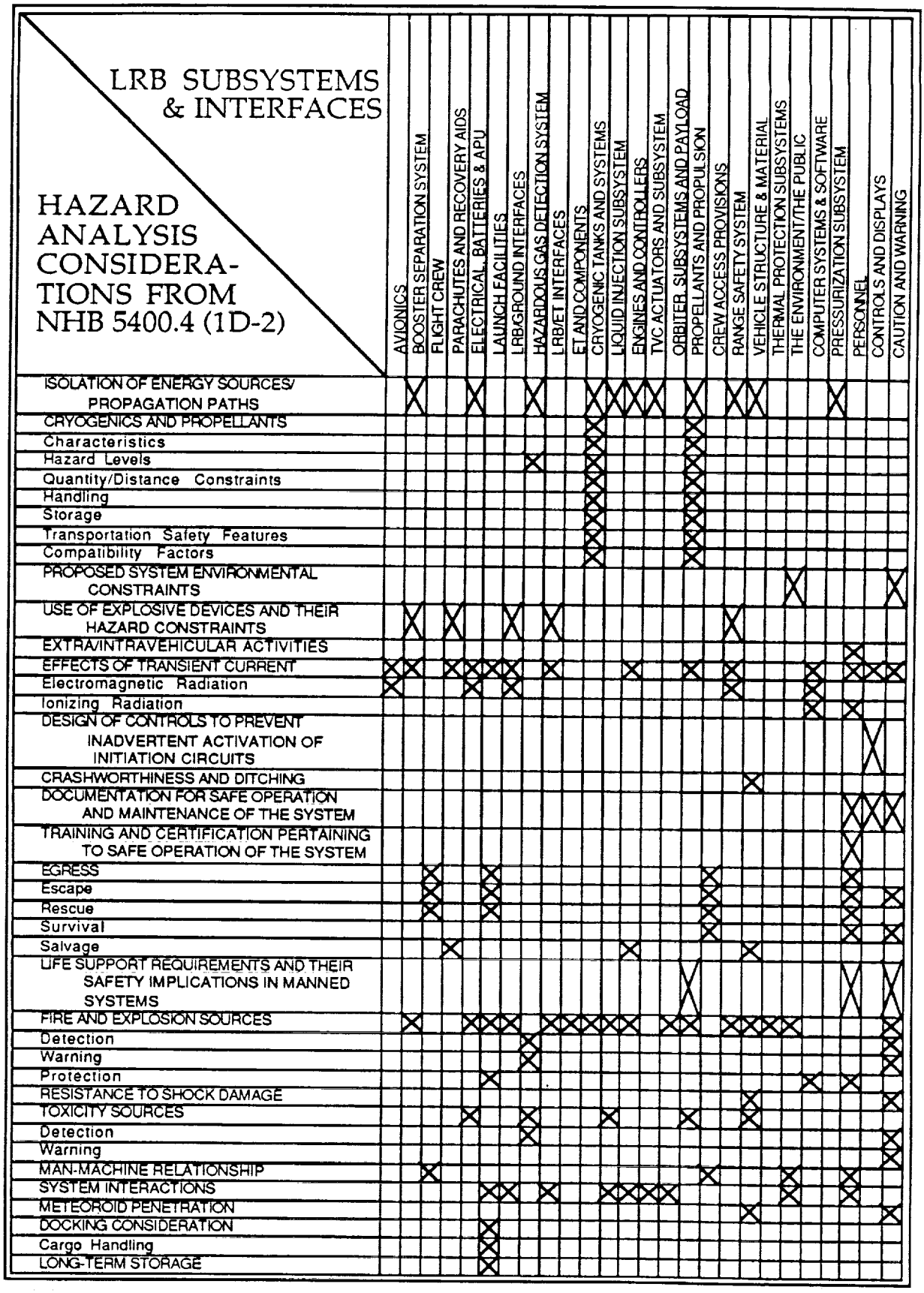
b. Cryogenic and propellant considerations are represented by the cryogenic and propulsion systems, respectively. Hazard levels are indicated by the HGDS.

c. Proposed system environmental constraints affect the environment and the public, and also dictate what caution and warning systems will be required.

d. Explosive devices are likely to be a part of the booster separation system, parachute deployment and separation subsystems, LRB/ground interface (holddown bolts and igniters), the LRB/ET interface separation bolts, and the range safety system.

e. The only extra- or intravehicular activities which can be envisioned are those performed as part of vehicle maintenance and preparation for launch, both of which require personnel access to the interior or selected parts of the LRB exterior.

f. Transient currents are likely to affect avionics, the booster separation system initiation circuits, the parachute deployment system, virtually all parts of the electrical system, launch facilities (lightning), LRB/ground interfaces, including


LRB SUBSYSTEMS & INTERFACES
HAZARD ANALYSIS CONSIDERATIONS FROM NHB 5400.4 (1D-2)
AVIONICS
BOOSTER SEPARATION SYSTEM
FLIGHT CREW
PARACHUTES AND RECOVERY AIDS
ELECTRICAL, BATTERIES & APU
LAUNCH FACILITIES
LRB/GROUND INTERFACES
HAZARDOUS GAS DETECTION SYSTEM
LRB/ET INTERFACES
ET AND COMPONENTS
CRYOGENIC TANKS AND SYSTEMS
LIQUID INJECTION SUBSYSTEM
ENGINES AND CONTROLLERS
TVC ACTUATORS AND SUBSYSTEM
ORBITER, SUBSYSTEMS AND PAYLOAD
PROPELLANTS AND PROPULSION
CREW ACCESS PROVISIONS
RANGE SAFETY SYSTEM
VEHICLE STRUCTURE & MATERIAL
THERMAL PROTECTION SUBSYSTEMS
THE ENVIRONMENT/THE PUBLIC
COMPUTER SYSTEMS & SOFTWARE
PRESSURIZATION SUBSYSTEM
PERSONNEL
CONTROLS AND DISPLAYS
CAUTION AND WARNING
ISOLATION OF ENERGY SOURCES/ PROPAGATION PATHS
CRYOGENICS AND PROPELLANTS
Characteristics
Hazard Levels
Quantity/Distance Constraints
Handling
Storage
Transportation Safety Features
Compatibility Factors
PROPOSED SYSTEM ENVIRONMENTAL CONSTRAINTS
USE OF EXPLOSIVE DEVICES AND THEIR HAZARD CONSTRAINTS
EXTRA/INTRAVEHICULAR ACTIVITIES
EFFECTS OF TRANSIENT CURRENT
Electromagnetic Radiation
Ionizing Radiation
DESIGN OF CONTROLS TO PREVENT INADVERTENT ACTIVATION OF INITIATION CIRCUITS
CRASHWORTHINESS AND DITCHING
DOCUMENTATION FOR SAFE OPERATION AND MAINTENANCE OF THE SYSTEM
TRAINING AND CERTIFICATION PERTAINING TO SAFE OPERATION OF THE SYSTEM
EGRESS
Escape
Rescue
Survival
Salvage
LIFE SUPPORT REQUIREMENTS AND THEIR SAFETY IMPLICATIONS IN MANNED SYSTEMS
FIRE AND EXPLOSION SOURCES
Detection
Warning
Protection
RESISTANCE TO SHOCK DAMAGE
TOXICITY SOURCES
Detection
Warning
MAN-MACHINE RELATIONSHIP
SYSTEM INTERACTIONS
METEOROID PENETRATION
DOCKING CONSIDERATION
Cargo Handling
LONG-TERM STORAGE

holddown bolt initiation electronics, the LRB/ET cabling, electrically operated propulsion system valves and engine controllers, sensors, range safety system electronics, computer systems, personnel (shock, burns), electrical controls and displays, and electrical caution and warning systems.

g. Design of controls to prevent inadvertent activation of initiation circuits obviously affects control and display systems. This consideration is not included under explosive devices initiated by electronics, as the matter at issue here is the controls, not the circuits themselves. Explosives represent a separate consideration.

h. Crashworthiness and ditching affects the vehicle structure and material, which, for recoverable boosters, must withstand impact with and immersion in seawater.

i. Documentation for safe system operation and maintenance (O&M) affects O&M personnel, controls and displays, and caution and warning systems.

j. Training and certification pertains to O&M personnel. Flight crew training is a separate issue which does not pertain to the LRB for the purposes of this hazard analysis.

k. Egress, escape and rescue pertain to the flight crew, launch facilities, crew access provisions, and personnel. The necessity to escape may be indicated by the caution and warning system as well. Survival with respect to the LRB affects crew access provisions, personnel, and those caution and warning systems which are a part of survival equipment. Although salvage affects all systems, it especially pertains to the parachutes, which are assumed to be recoverable, and also to the engines and the vehicle structure because of their high salvage dollar value.

l. Life support requirements for the LRB will consist mainly of those requirements for life support and monitoring equipoment to protect against toxicity of propellants. This considerations pertains to personnel, and to caution and warning systems employed to detect the presence of propellants and their vapors.

m. Fire and explosion sources include the booster separation system, which could ignite or char ET TPS (which is both a booster separation hazard an an ET interface hazard), electrical system components, fires on the launch pad from whatever source, fires caused by the LRB exhaust (which could pose a problem peculiar to the LRB if the engines were shut down before liftoff), engine exhuast plume heating of the ET TPS, leaks of flammable cryogens, including hydrogen, leaks in the liquid injection system, engine operation, fires aboard the Orbiter, all types of propellant leaks, operation of the range safety system or explosion of its batteries, damage to the vehicle structure, and ignition of TPS. Any type of fire or explosion on the pad is likely to have serious environmental and political effects, and must be prevented by adequate caution and warning systems. Requirements for fire detection may affect the design of the HGDS, which might be capable of providing

warning of fire as well as the presence of hazardous gas. Finally, additional fire protection will be required at the launch facility due to the LRB exhaust and necessary software will have to be developed and made available for personnel training.

n. Resistance to shock damage pertains primarily to the structural capability of the vehicle and its components. Caution and warning devices will be required to protect delicate components from shock during transportation.

o. Toxicity sources include batteries, APU exhaust, propellents including TVC injection liquid, and possibly toxic dusts or hazardous slivers from the vehicle construction material. The HGDS should provide caution and warning of leakage of toxic gases.

p. Man-machine relationships pertain primarily to the flight crew, but also to crew access provisions, and possibly to public reaction to STS operations using the LRB. Certainly the vehicle must be engineered to be compatible with the capabilities of personnel who build, check and maintain it.

q. System interaction considerations include those affecting launch facilities, LRB/ground interfaces, LRB/ET interfaces, the liquid injection system (due to possible impact to ET exhaust plume thermal protection), engines and controllers, the TVC systems, and the Orbiter, again, due to exhause plume effects. Possible impact on the environment should be taken into consideration, as should the effect on maintenance crews and operating personnel.

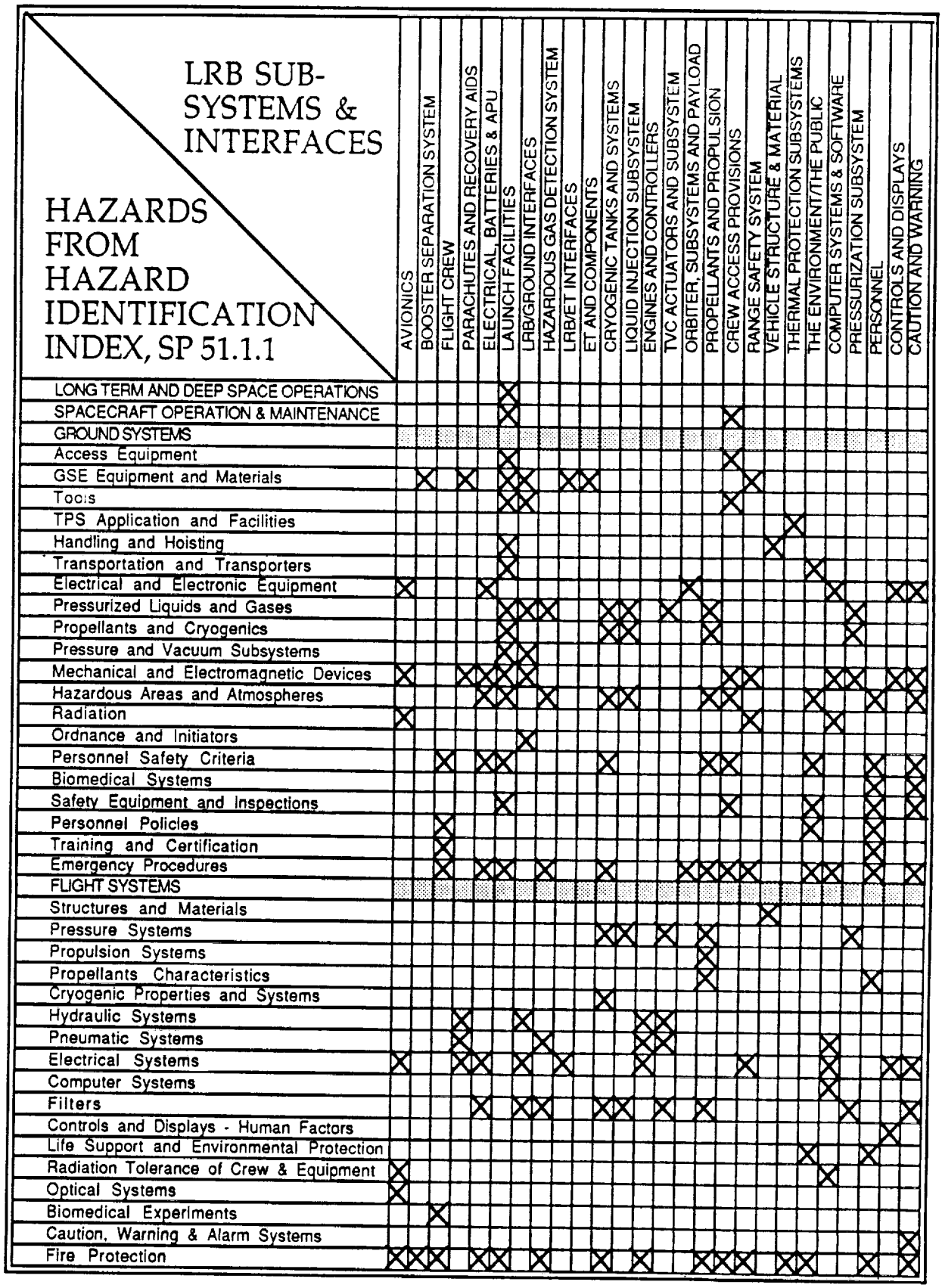
r. Meteoroid penetration is a consideration which pertains to the vehicle structure, and should be detected by the caution and warning system if meteoroids are a problem at the maximum altitude at which the LRB is designed to operate.

s. Docking considerations, including cargo handling, are a consideration in adapting launch facilities and transportation systems to LRB handling.

t. Long term storage is also a consideration involving the launch facilities.

10. HAZARD IDENTIFICATION INDEX - Table 1 of Martin Marietta Manned Space Systems Standard Procedure (SP) 51.1.1, Hazard Analysis, contains a checklist of hazards, activities and systems referred to as a "Hazard Identification Index." Those elements of this index which are directly applicable to the identified LRB subsystems are shown on the next page. This matrix shows the subsystems to which these index elements are considered to pertain. The following is the rationale for the entries shown in the matrix.

a. Long term operations will involve storage or other operations in the VAB or other ground facilities. Deep space operations are not applicable to the LRB.


LRB SUB-SYSTEMS & INTERFACES
HAZARDS FROM HAZARD IDENTIFICATION INDEX, SP 51.1.1
AVIONICS
BOOSTER SEPARATION SYSTEM
FLIGHT CREW
PARACHUTES AND RECOVERY AIDS
ELECTRICAL, BATTERIES & APU
LAUNCH FACILITIES
LRB/GROUND INTERFACES
HAZARDOUS GAS DETECTION SYSTEM
LRB/ET INTERFACES
ET AND COMPONENTS
CRYOGENIC TANKS AND SYSTEMS
LIQUID INJECTION SUBSYSTEM
ENGINES AND CONTROLLERS
TVC ACTUATORS AND SUBSYSTEM
ORBITER, SUBSYSTEMS AND PAYLOAD
PROPELLANTS AND PROPULSION
CREW ACCESS PROVISIONS
RANGE SAFETY SYSTEM
VEHICLE STRUCTURE & MATERIAL
THERMAL PROTECTION SUBSYSTEMS
THE ENVIRONMENT/THE PUBLIC
COMPUTER SYSTEMS & SOFTWARE
PRESSURIZATION SUBSYSTEM
PERSONNEL
CONTROLS AND DISPLAYS
CAUTION AND WARNING
LONG TERM AND DEEP SPACE OPERATIONS
SPACECRAFT OPERATION & MAINTENANCE
GROUND SYSTEMS
Access Equipment
GSE Equipment and Materials
Tools
TPS Application and Facilities
Handling and Hoisting
Transportation and Transporters
Electrical and Electronic Equipment
Pressurized Liquids and Gases
Propellants and Cryogenics
Pressure and Vacuum Subsystems
Mechanical and Electromagnetic Devices
Hazardous Areas and Atmospheres
Radiation
Ordnance and Initiators
Personnel Safety Criteria
Biomedical Systems
Safety Equipment and Inspections
Personnel Policies
Training and Certification
Emergency Procedures
FLIGHT SYSTEMS
Structures and Materials
Pressure Systems
Propulsion Systems
Propellants Characteristics
Cryogenic Properties and Systems
Hydraulic Systems
Pneumatic Systems
Electrical Systems
Computer Systems
Filters
Controls and Displays - Human Factors
Life Support and Environmental Protection
Radiation Tolerance of Crew & Equipment
Optical Systems
Biomedical Experiments
Caution, Warning & Alarm Systems
Fire Protection

b. Spacecraft operation and maintenance will impact the design of launch facilities, perticularly access provisions for operation and maintenance crews.

c. Ground systems considerations include the following:

(1) Access equipment includes those launch facility modifications and crew access provisions required by the LRB.

(2) GSE equipment and materials which directly interface with the LRB may include the booster separation system, parachutes or other recovery aids, launch facilities, LRB/ground interfaces, LRB/ET interface hardware, the ET and some of its components, and the range safety system.

(3) Major tools will be required for the launch facilities, LRB/ground interfaces, and crew access.

(4) TPS application and facilities will be required for the application of material comprising thermal protection subsystems.

(5) Handling and hoisting equipment modifications will be required for the launch facilities. The vehicle structure will have to withstand loads imposed by lifting and handling operations.

(6) New transporters will be required at the launch facilities to transport the LRBs. Transportation of hazardous components or materials (such as hypergols) will potentially impact the public and the environment, and appropriate plans for spills or other transportation contingencies will have to be made.

(7) Electrical and electronic equipment will be required to check out vehicle avionics and electrical interfaces. New electrical interfaces may be required between the Orbiter and ground systems to provide for new LRB electronics. New computer systems and software may be required for countdown operations. These include controls and displays and caution and warning systems.

(8) Pressurized liquids and gasses for the LRB will be required at the launch facilities to provide for new LRB/ground interfaces, including the hazardous gas detection system. These may include cryogens, propellants for the liquid injection system, the TVC system, the main propulsion system, and the pressurization subsystem.

(9) Propellants and cryogens will be required at the launch facility for the cryogenic subsystems, liquid injection subsystems, propellant system, and tank pressurization subsystem.

(10) Other pressure and vacuum subsystems may be required at the new LRB/ground interfaces, in addition to those noted above.

(11) Mechanical and electromagnetic devices will be required to check out LRB avionics, parachutes, recovery aids, and the LRB electrical systerm. These will include not only those at the launch facilities, but also LRB/ground communication systems. Mechanical and electromagnetic devices may also be required for crew access, RSS checkout, computer systems, pressurization systems, and for new control and display and perhaps caution and warning purposes.

(12) Hazardous areas and atmospheres in the ground facilities due to the LRB may be caused by APU exhaust, battery electrolyte, cryogens, liquid injection fluids, and propellants. The location and hazards presented by these areas will affect crew access and personnel, and may dictate requirements for new caution and warning equipment. Finally, any hazardous areas and/or atmospheres must be examined with respect to their impact on the public and the environment.

(13) Although radioactive substances will probably not be used in the LRB, there may be hazards associated with electromagnetic radiation for telemetry or RSS checkout on the ground. Ground computer systems must be protected from the effects of electromagnetic interference as well as being prevented from being interference emitters.

(14) Ordnance and initiators can be expected to be used on the LRB holddown bolts, which are ground interfaces.

(15) Personnel safety criteria for launch support personnel, the general public, and flight crew operations may be required due to the hazardous areas and atmospheres noted in 12, above.

(16) Due to new hazards, biomedical monitoring may be required of ground personnel, and caution and warning systems may monitor biological functions.

(17) Safety equipment includes that for crew access safety as well as personal safety equipment. This equipment may include caution and warning provisions. Inspections of this equipment, as well as the launch facilities will be required, along with environmental pollution monitoring.

(18) Considerations noted in (12), (15) and (17), above, may require that new personnel policies be established for the flight crew and launch support personnel. Existing EPA regulations regarding public exposure to hazards must also be taken into consideration.

(19) New training and certification programs may be required for the flight crew and ground personnel.

(20) New plans or modifications to existing emergency procedures may be required for the flight crew and support personnel for electrical malfunctions, battery failure or leakage, accidents at the launch facility, cryogen leaks, protection of the

Orbiter, LRB propellant leaks, crew escape provisions, range safety system failures, environmental contamination, politically sensitive accidents and incidents, and computer malfunctions. New caution and warning systems may be required to implement these procedures.

c. Flight systems checklist elements pertain to the LRB subsystems and interfaces as noted below:

(1) Structures and materials are separately considered as a subsystem.

(2) Pressure systems include cryogenic systems, the liquid injection subsystem, TVC actuation system, propulsion system and pressurization subsystem.

(3) Propulsion systems are separately considered.

(4) Propellants characteristics affect the design of the propulsion system and personnel safety considerations.

(5) Cryogenic properties and systems are considered as a subsystem.

(6) Hydraulic systems may be employed in recovery aids, LRB/ground interfaces, engine controls, and the TVC system.

(7) Pneumatic systems may be employed in the recovery subsystem, HGDS, engine controls, TVC actuators, and possibly in fluidic computer systems.

(8) Electrical systems include avionics, recovery aids, the LRB electrical system, LRB/ground interfaces, LRB/ET interfaces, engine control electronics, RSS electronics, controls and displays, and caution and warning equipment.

(9) Computer systems are considered a vehicle subsystem.

(10) Filters may be incorporated into battery vents, APU fuel lines, facility interfaces, the HGDS, cryogen systems, the liquid injection system, TVC hydraulics, propellent systems, and pressurization systems. Caution and warning of filter contamination may be required.

(11) Controls and displays are considered a vehicle subsystem. They will have to be ergonomically designed.

(12) Life support and environmental protection systems protect personnel and the environment.

(13) Ionizing radiation is not expected to be a problem in the design of the LRB, but electromagnetic radiation protection may be required for avionics and computer systems.

(14) The only optical systems likely to be employed in the LRB are ring laser gyroscopes, which are avionic devices.

(15) Biomedical experiments will affect only the flight crew. It is not likely that the design of the LRB will be guided by this consideration.

(16) Caution, warning and alarm systems are considered as a LRB vehicle subsystem.

(17) Fire protection will be required for the avionics bays and for the booster separation system. Protection will be required from electrical ignition, propagation of fires from the launch facility, and fires in areas monitored by the hazardous gas detection system. Fires may be caused by cryogen leaks, engine operation, leaks in the propellant system, and ignition of TPS. Protection of the RSS, launch support personnel and the public from fire are all major concerns, and consideration must be given to egress provisions for the flight crew and launch support personnel. New means of caution and warning of fire may be required.

11. HAZARD DEVELOPMENT - Having defined the systems to be considered, the next step in the PHA is development of the hazards to be considered. This is the most difficult step in this activity, because there are literally hundreds of possible ways and time periods in which a credible condition could be a potential source of danger to the systems listed on page 3 and in the matrices on pages 7 and 10. One rational approach to identifying possible hazards is to call upon lessons learned in prior space programs. Unfortunately, the list of potential hazards either identified and protected against or actually encountered in prior programs is unmanageably large. The approach to be used in this analysis is to examine lists of hazards required to be considered in order to develop a relatively small number of what may be called composite hazards. Individually, these will be rather broadly defined but, when taken together, will encompass the entire spectrum of hazards required to be investigated.

a. The composite hazards to be considered in this PHA are:

(1) Hazardous Environments
(2) Worker Overload
(3) Unsafe/unhygienic working conditions
(4) Meteoroids & Meteorites
(5) Wind
(6) Contamination
(7) Heat Sources
(8) Radiation/Sunlight
(9) Moisture/Precipitation
(10) Electrical System Malfunction
(11) Differential Pressure
(12) Vibration, Acoustic Loads & Shock
(13) Structural Loads

(14) Leaks
(15) Propellant Characteristics & Products
(16) Lightning/Electromagnetic Discharge
(17) Faulty Documentation
(18) Chemical Activity
(19) Computer System Malfunction
(20) Operator Error
(21) Wear
(22) Emergencies

b. Each of the previously identified systems will be examined to determine if danger or jeopardy from each of these composite hazards is credible. If so, a hazard analysis will be performed. If not, this determination will be documented. This process is discussed in paragraphs 21 f and 21 g beginning on page 52.

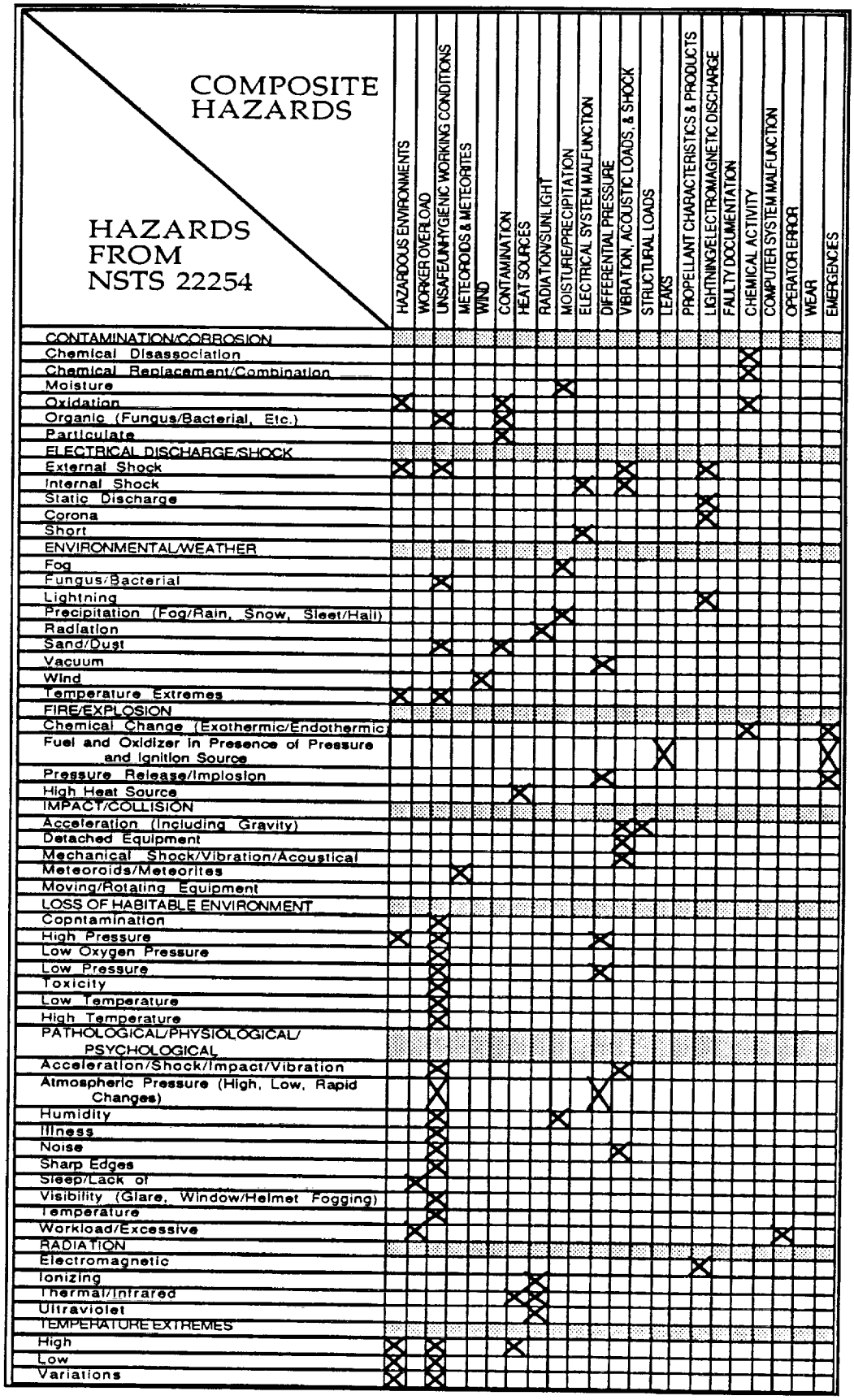
12. GENERIC HAZARDS - Paragraph 3.1.4 b of NSTS 22254 suggests a number of generic hazards to be considered in the PHA. These are: contamination/corrosion, electrical discharge/shock, environmental/weather, fire/explosion, impact/collision, loss of habitable environment, pathological/physiological/psychological, radiation, and temperature extremes. Each of these generic hazards is further divided into generic hazard types. These generic hazards and hazard types are shown in the matrix on the next page. The matrix shows which of the previously defined composite hazards include each of the the generic hazard types. Correspondence between the two lists is determined as follows:

a. Contamination/Corrosion includes chemical activity, moisture/precipitation, contamination, unsafe or unhygienic working conditions, and hazardous environments.

b. Electrical discharge/shock appears to include not only electric shock from exposed electrical conduits, which might be caused by electrical system shorts, other malfunction or unsasfe working conditions, but also shock from lightning and electromagnetic discharge. The term "shock" might also refer to impacts, which might occur in hazardous environments. Static discharge is not normally hazardous unless it occurs as a spark or a momentary current, in which case it is the associated electromagnetic discharge which is hazardous. The same is true for corona discharge.

c. The hazardous consequences of weather arise from moisture, unsafe working conditions, lightning, solar radiation, sand and dust, pressure changes, and those characteristics which result in unsafe working conditions or exposure of components intended to be maintained in a controlled environment.

d. Fires are always hazardous due to the heat and possible ignition source produced, as well as the associated emergency which results. A fire may also cause heating and subsequent differential pressure in normally unpressurized enclosures.


COMPOSITE HAZARDS
HAZARDS FROM NSTS 22254
HAZARDOUS ENVIRONMENTS
WORKER OVERLOAD
UNSAFE/UNHYGIENIC WORKING CONDITIONS
METEOROIDS & METEORITES
WIND
CONTAMINATION
HEAT SOURCES
RADIATION/SUNLIGHT
MOISTURE/PRECIPITATION
ELECTRICAL SYSTEM MALFUNCTION
DIFFERENTIAL PRESSURE
VIBRATION, ACOUSTIC LOADS, & SHOCK
STRUCTURAL LOADS
LEAKS
PROPELLANT CHARACTERISTICS & PRODUCTS
LIGHTNING/ELECTROMAGNETIC DISCHARGE
FAULTY DOCUMENTATION
CHEMICAL ACTIVITY
COMPUTER SYSTEM MALFUNCTION
OPERATOR ERROR
WEAR
EMERGENCIES
CONTAMINATION/CORROSION
Chemical Disassociation
Chemical Replacement/Combination
Moisture
Oxidation
Organic (Fungus/Bacterial, Etc.)
Particulate
ELECTRICAL DISCHARGE/SHOCK
External Shock
Internal Shock
Static Discharge
Corona
Short
ENVIRONMENTAL/WEATHER
Fog
Fungus/Bacterial
Lightning
Precipitation (Fog/Rain, Snow, Sleet/Hail)
Radiation
Sand/Dust
Vacuum
Wind
Temperature Extremes
FIRE/EXPLOSION
Chemical Change (Exothermic/Endothermic)
Fuel and Oxidizer in Presence of Pressure and Ignition Source
Pressure Release/Implosion
High Heat Source
IMPACT/COLLISION
Acceleration (Including Gravity)
Detached Equipment
Mechanical Shock/Vibration/Acoustical
Meteoroids/Meteorites
Moving/Rotating Equipment
LOSS OF HABITABLE ENVIRONMENT
Copntamination
High Pressure
Low Oxygen Pressure
Low Pressure
Toxicity
Low Temperature
High Temperature
PATHOLOGICAL/PHYSIOLOGICAL/ PSYCHOLOGICAL
Acceleration/Shock/Impact/Vibration
Atmospheric Pressure (High, Low, Rapid Changes)
Humidity
Illness
Noise
Sharp Edges
Sleep/Lack of
Visibility (Glare, Window/Helmet Fogging)
Temperature
Workload/Excessive
RADIATION
Electromagnetic
Ionizing
Thermal/Infrared
Ultraviolet
TEMPERATURE EXTREMES
High
Low
Variations

Propellant leaks, especially those associated with hypergols, can be assumed to have an ignition source, and can be expected to result in fires whever they occur.

e. Impacts and collisions will result in physical shock. Meteoroids are a separate concern, and may not be applicable to the LRB at the altitudes at which it operates.

f. Since the LRB is is not a manned system, the concerns regarding loss of habitable environment are those associated with unsafe working conditions of the launch support crew. Differential pressure may be a separate concern.

g. Conditions adversely affecting workers may be considered unsafe working conditions, with the exception of lack of sleep and excessive workload, the latter of which may become a source of worker error. Humidity may be caused by moisture intrusion or precipitation. Acceleration and noise can also be sources of hazardous shock and vibration, and atmospheric pressure changes can cause hazards through the differential pressure which results.

h. Although radioactive materials are not expected to be used in the LRB, there remains a concern due to lightning, the effects of sunlight, and heat sources.

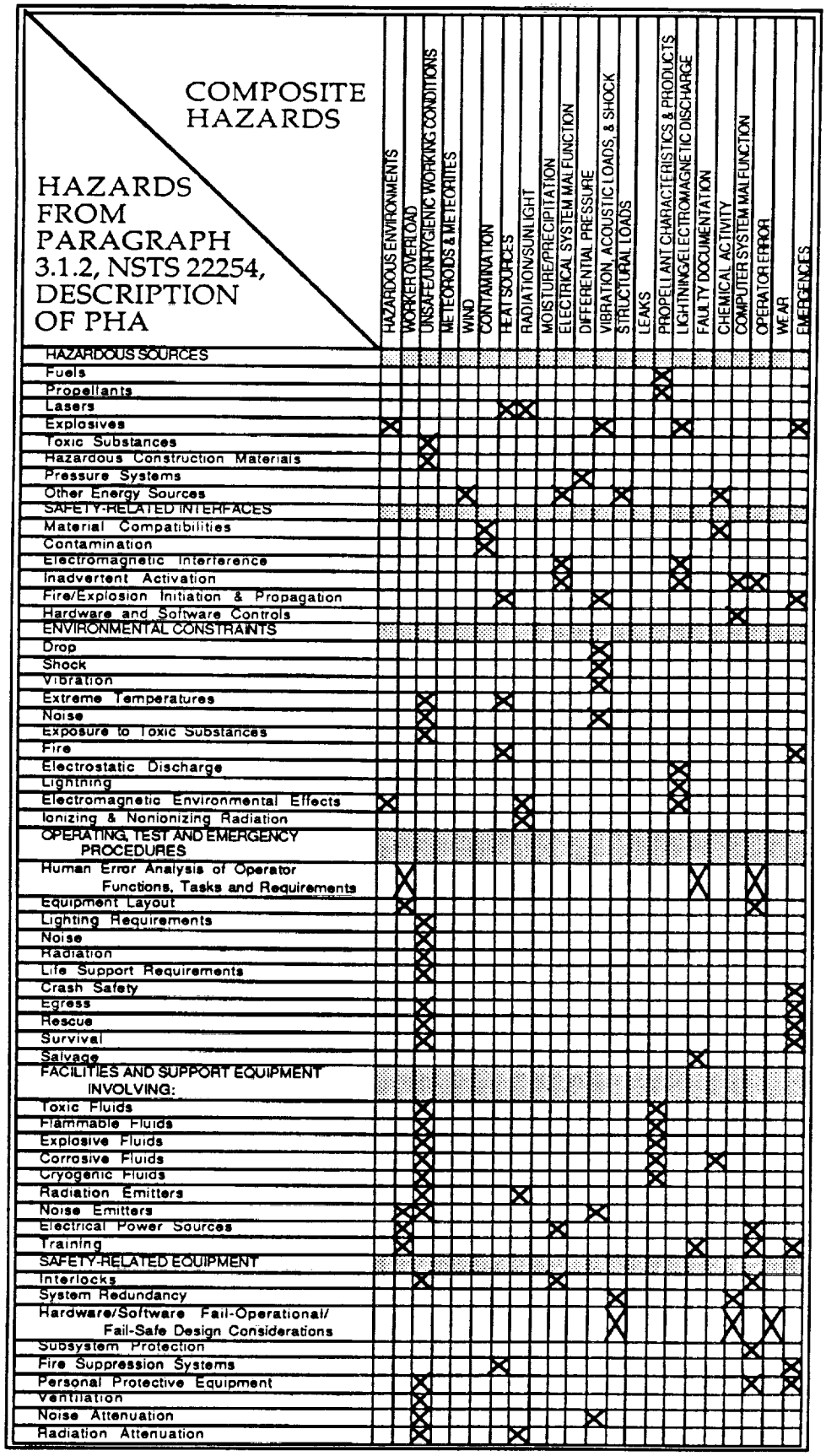
i. Temperature extremes can subject sensitive equipment to hazardous environments and may be unhealthy for workers. High heat sources are a separate concern due to the possibility of ignition of flammable materials.

j. It should be noted that none of the hazards from NSTS 22254 addresses the subject of wear. However, wear is a potential hazard, and appears to be a valid concern for analysis.

13. PHA CONSIDERATIONS - Although the generic hazards to be considered in a hazard analysis are contained in paragraph 3.1.4 of NSTS 22254, paragraph 3.1.2, Description, includes additional considerations. This paragraph states in part, "The PHA provides consideration of the following, as a minimum, for identification and evaluation of hazards." The correspondence between these considerations and the composite hazards selected is shown in the matrix on the following page.

a. Hazards associated with the hazardous sources noted include the characteristics of propellants; heating and radiation from lasers; hazards associated with environmental constraints, ignition of explosives from shock and lightning, and the emergencies potentially associated with them. Toxic and hazardous materials could cause unsafe working conditions, and pressure systems are associated with hazards caused by differential pressure. Other energy sources not previously mentioned include wind, electrical energy, strain energy in the LRB vehicle structure, and chemical activity.

b. Safety-related interfaces include those associated with contamination of


COMPOSITE HAZARDS
HAZARDS FROM PARAGRAPH 3.1.2, NSTS 22254, DESCRIPTION OF PHA
HAZARDOUS ENVIRONMENTS
WORKER OVERLOAD
UNSAFE/UNHYGIENIC WORKING CONDITIONS
METEOROIDS & METEORITES
WIND
CONTAMINATION
HEAT SOURCES
RADIATION/SUNLIGHT
MOISTURE/PRECIPITATION
ELECTRICAL SYSTEM MALFUNCTION
DIFFERENTIAL PRESSURE
VIBRATION, ACOUSTIC LOADS, & SHOCK
STRUCTURAL LOADS
LEAKS
PROPELLANT CHARACTERISTICS & PRODUCTS
LIGHTNING/ELECTROMAGNETIC DISCHARGE
FAULTY DOCUMENTATION
CHEMICAL ACTIVITY
COMPUTER SYSTEM MALFUNCTION
OPERATOR ERROR
WEAR
EMERGENCIES
HAZARDOUS SOURCES
Fuels
Propellants
Lasers
Explosives
Toxic Substances
Hazardous Construction Materials
Pressure Systems
Other Energy Sources
SAFETY-RELATED INTERFACES
Material Compatibilities
Contamination
Electromagnetic Interference
Inadvertent Activation
Fire/Explosion Initiation & Propagation
Hardware and Software Controls
ENVIRONMENTAL CONSTRAINTS
Drop
Shock
Vibration
Extreme Temperatures
Noise
Exposure to Toxic Substances
Fire
Electrostatic Discharge
Lightning
Electromagnetic Environmental Effects
Ionizing & Nonionizing Radiation
OPERATING, TEST AND EMERGENCY PROCEDURES
Human Error Analysis of Operator Functions, Tasks and Requirements
Equipment Layout
Lighting Requirements
Noise
Radiation
Life Support Requirements
Crash Safety
Egress
Rescue
Survival
Salvage
FACILITIES AND SUPPORT EQUIPMENT INVOLVING:
Toxic Fluids
Flammable Fluids
Explosive Fluids
Corrosive Fluids
Cryogenic Fluids
Radiation Emitters
Noise Emitters
Electrical Power Sources
Training
SAFETY-RELATED EQUIPMENT
Interlocks
System Redundancy
Hardware/Software Fail-Operational/ Fail-Safe Design Considerations
Subsystem Protection
Fire Suppression Systems
Personal Protective Equipment
Ventilation
Noise Attenuation
Radiation Attenuation

fluids delivered to the LRB, interference from or inadvertent activation of electrical systems caused by electrical malfunction, lightning or other electromagnetic radiation. Inadvertent activation could also occur as a result of computer malfunction or operator error. Fires and explosions could result in high heat sources, physical shock, and hazards associated with emergency procedures. Hardware and software controls are associated with computer systems, and share the same hazards.

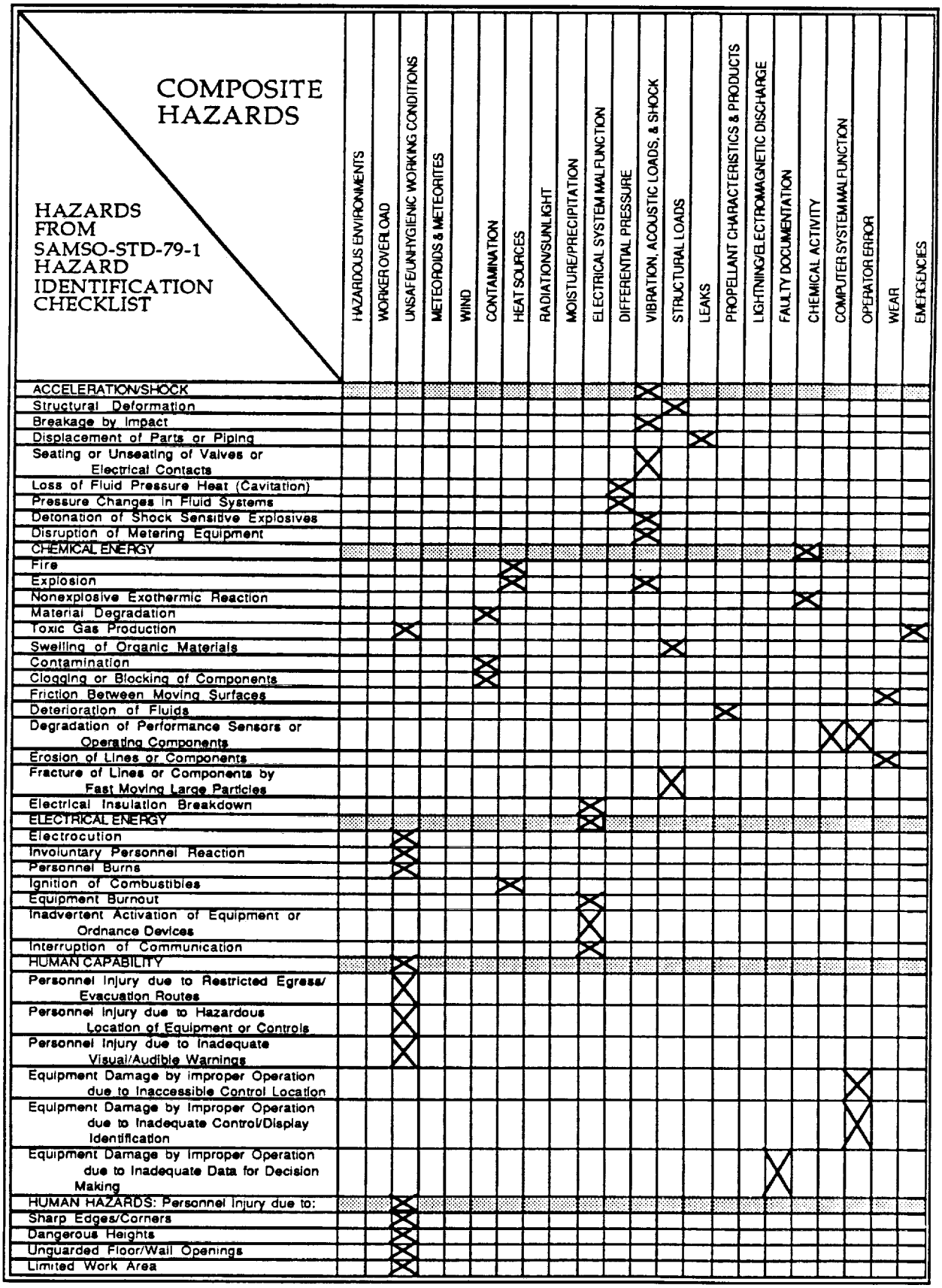
c. Environmental constraints are include vibration, worker health, high heat sources, hazards associated with radio frequency interference and lightning, and various forms of radiation. Hazards associated with fire also include those which result from the emergency situation created by fire.

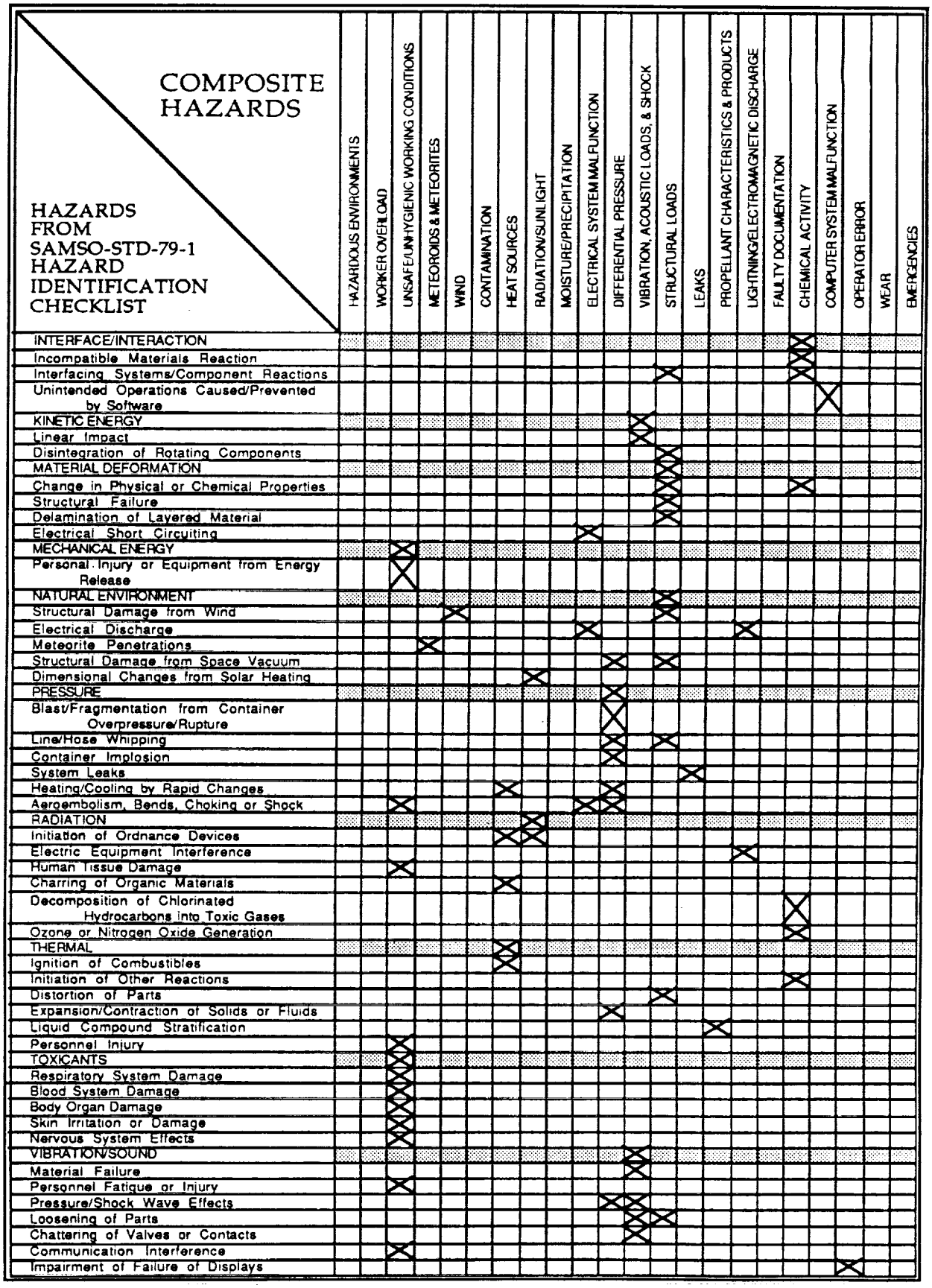
d. Hazards associated with procedures include those associated with worker overload and unhygienic working conditions, faulty documentation, operator error, and hazardous conditions created during actual or simulated emergencies.

e. Hazards associated with facilities and support equipment deal mainly with unsafe working conditions and worker overload. Radiation, noise and electrical power sources (which may cause worker overload due to manual operation of failed computerized electrically actuated systems) are noted in the PHA considerations and the list of composite hazards. Potentially hazardous characteristics of propellants which may become industrial health concerns are included in these concerns. Finally training considerations require attention to the possibility of worker overload, faulty procedural documentation, the possibility of operator error, and hazards associated with emergency operations, either real or simulated.

f. The listed safety-related equipment considerations involve hazards which may be associated with unsafe working conditions. Also considered are heat resulting from fire and radiation, which may include that from X-raying of welds. Electrical interlocks, acoustic energy, and hazards associated with single failures of non-redundant structural components are included in this list. Hazards due to lack of redundancy also include those associated with computer failure. Operator error may cause hazards due to manual operation of subsystems or improper use of protective equipment. Normally fail-safe components may be degraded by wear to the point that failure is likely, therby reducing the portection afforded. Also, since fire and the requirement for personal protective equipment both involve emergencies, hazards associated with emergencies apply.

14. SAMSO HAZARD CHECKLIST - Another checklist which may be used for LRB hazard identification is found in SAMSO-STD-79-1, Integrated System Safety Program for the MX Weapons System. This popularity of this checklist is indicated by the fact that this same list is also published in System Safety Engineering and Management by Roland and Moriarty, and in the Martin Marietta Denver Aerospace System Safety Engineering Manual. Two matrices which show these hazards, their potential effects or consequent accidents, and the relationship of these effects to the previously identified composite hazards are shown on the next two pages. The


COMPOSITE HAZARDS
HAZARDS FROM SAMSO-STD-79-1 HAZARD IDENTIFICATION CHECKLIST
HAZARDOUS ENVIRONMENTS
WORKER OVERLOAD
UNSAFE/UNHYGIENIC WORKING CONDITIONS
METEOROIDS & METEORITES
WIND
CONTAMINATION
HEAT SOURCES
RADIATION/SUNLIGHT
MOISTURE/PRECIPITATION
ELECTRICAL SYSTEM MALFUNCTION
DIFFERENTIAL PRESSURE
VIBRATION, ACOUSTIC LOADS, & SHOCK
STRUCTURAL LOADS
LEAKS
PROPELLANT CHARACTERISTICS & PRODUCTS
LIGHTNING/ELECTROMAGNETIC DISCHARGE
FAULTY DOCUMENTATION
CHEMICAL ACTIVITY
COMPUTER SYSTEM MALFUNCTION
OPERATOR ERROR
WEAR
EMERGENCIES
ACCELERATION/SHOCK
Structural Deformation
Breakage by Impact
Displacement of Parts or Piping
Seating or Unseating of Valves or Electrical Contacts
Loss of Fluid Pressure Heat (Cavitation)
Pressure Changes in Fluid Systems
Detonation of Shock Sensitive Explosives
Disruption of Metering Equipment
CHEMICAL ENERGY
Fire
Explosion
Nonexplosive Exothermic Reaction
Material Degradation
Toxic Gas Production
Swelling of Organic Materials
Contamination
Clogging or Blocking of Components
Friction Between Moving Surfaces
Deterioration of Fluids
Degradation of Performance Sensors or Operating Components
Erosion of Lines or Components
Fracture of Lines or Components by Fast Moving Large Particles
Electrical Insulation Breakdown
ELECTRICAL ENERGY
Electrocution
Involuntary Personnel Reaction
Personnel Burns
Ignition of Combustibles
Equipment Burnout
Inadvertent Activation of Equipment or Ordnance Devices
Interruption of Communication
HUMAN CAPABILITY
Personnel Injury due to Restricted Egress/ Evacuation Routes
Personnel Injury due to Hazardous Location of Equipment or Controls
Personnel Injury due to Inadequate Visual/Audible Warnings
Equipment Damage by Improper Operation due to Inaccessible Control Location
Equipment Damage by Improper Operation due to Inadequate Control/Display Identification
Equipment Damage by Improper Operation due to Inadequate Data for Decision Making
HUMAN HAZARDS: Personnel Injury due to:
Sharp Edges/Corners
Dangerous Heights
Unguarded Floor/Wall Openings
Limited Work Area


COMPOSITE HAZARDS
HAZARDS FROM SAMSO-STD-79-1 HAZARD IDENTIFICATION CHECKLIST
HAZARDOUS ENVIRONMENTS
WORKER OVERLOAD
UNSAFE/UNHYGIENIC WORKING CONDITIONS
METEOROIDS & METEORITES
WIND
CONTAMINATION
HEAT SOURCES
RADIATION/SUNLIGHT
MOISTURE/PRECIPITATION
ELECTRICAL SYSTEM MALFUNCTION
DIFFERENTIAL PRESSURE
VIBRATION, ACOUSTIC LOADS, & SHOCK
STRUCTURAL LOADS
LEAKS
PROPELLANT CHARACTERISTICS & PRODUCTS
LIGHTNING/ELECTROMAGNETIC DISCHARGE
FAULTY DOCUMENTATION
CHEMICAL ACTIVITY
COMPUTER SYSTEM MALFUNCTION
OPERATOR ERROR
WEAR
EMERGENCIES
INTERFACE/INTERACTION
Incompatible Materials Reaction
Interfacing Systems/Component Reactions
Unintended Operations Caused/Prevented by Software
KINETIC ENERGY
Linear Impact
Disintegration of Rotating Components
MATERIAL DEFORMATION
Change in Physical or Chemical Properties
Structural Failure
Delamination of Layered Material
Electrical Short Circuiting
MECHANICAL ENERGY
Personal Injury or Equipment from Energy Release
NATURAL ENVIRONMENT
Structural Damage from Wind
Electrical Discharge
Meteorite Penetrations
Structural Damage from Space Vacuum
Dimensional Changes from Solar Heating
PRESSURE
Blast/Fragmentation from Container Overpressure/Rupture
Line/Hose Whipping
Container Implosion
System Leaks
Heating/Cooling by Rapid Changes
Aeroembolism, Bends, Choking or Shock
RADIATION
Initiation of Ordnance Devices
Electric Equipment Interference
Human Tissue Damage
Charring of Organic Materials
Decomposition of Chlorinated Hydrocarbons into Toxic Gases
Ozone or Nitrogen Oxide Generation
THERMAL
Ignition of Combustibles
Initiation of Other Reactions
Distortion of Parts
Expansion/Contraction of Solids or Fluids
Liquid Compound Stratification
Personnel Injury
TOXICANTS
Respiratory System Damage
Blood System Damage
Body Organ Damage
Skin Irritation or Damage
Nervous System Effects
VIBRATION/SOUND
Material Failure
Personnel Fatigue or Injury
Pressure/Shock Wave Effects
Loosening of Parts
Chattering of Valves or Contacts
Communication Interference
Impairment of Failure of Displays

correspondence between the two lists of hazards lies in the fact that each can be identified with specific consequences, as shown in the foregoing matrices. The X in the shaded bar next to each hazard in the checklist indicates the most closely associated composite hazard. However, other hazards may be potential causes of the effects listed, as shown in the matrices and discussed below:

a. The effects shown for acceleration/shock are generally those associated with *changes* of acceleration. However, structural loads are necessary for structural deformation, and the most serious hazard related to displacement of parts or piping where hazardous fluids are concerned is leakage. Loss of fluid pressure and cavitation both require the hazard of differential pressure as a necessary condition.

b. Chemical energy is most closely associated with chemical activity. However, there are other associated hazards, such as unsafe working conditions in which toxic gas may be a hazard. (Toxic gas production is not a hazard if personnel exposure is not a credible condition.) Contamination can result in material degredation, contaminated areas, or clogging or blocking of components. Some kind of heat source is required for fire or explosion, although both are chemical reactions. Also, while insulation breakdown can be caused by chemical activity, it can also result from electrical malfunction such as arcing. Explosions can be produced by mechanical shock (and subsequent sustainment due to exothermic reaction). Structural loads can be both a cause or an effect of swelling of organic components, and fracture of lines is essentially brought about by overloading of the structure of the lines. Deterioration of fluids is dependent upon the characteristics of the fluids. Degredation of sensors or components is not likely to be hazardous until such sensors or components are required to operate, either by computer systems, or operators using false or misleading data. Finally, wear can increase friction and cause erosion of lines and components, and an emergency such as a leak, spill, structural failure of piping, or structural failure of a container or a transporter can be a cause of unintentional mixing of chemicals which could cause toxic gas production.

c. The hazards associated with electrical energy appear to be the same as those associated with electrical system malfunction, although those which affect personnel may be due to unsafe working conditions and worker exposure to live contacts. Ignition of combustibles by electrical energy occurs when that energy appears as a heat source.

d. Human capability does not appear to be a hazard as much as is unsafe or unhygienic working conditions. Hazards due to inadequate data have more to do with faulty data (documentation) than with the capability of the operator, and equipment damage due to inadequate controls or displays is possible only if such controls or displays are used improperly (in error) by the operator.

e. The human hazards shown are all unsafe working conditions.

f. Interface/interaction hazards appear to be related to chemical activity,

although loads transmitted through structural interfaces could be hazardous. Unintended software operations appear to be related to computer system malfunction due to faulty software.

g. Kinetic energy hazards appear to be related to shock and structural loads.

h. The effects of material deformation hazards may be related to structural loads, although electrical short circuiting is certainly an electrical system malfunction and changes in physical or chemical properties may be related to chemical activity.

i. The "natural environment" hazard shown appears to be related to those environmental factors which can cause excessive structural loads. Meteorites are a separate concern, as is wind damage. Dimensional changes due to solar heating are due to solar radiation, and unsafe electrical discharges are related to electrical system malfunction or possibly from lightning or other atmospheric discharge. Structural damage from space vacuum appears to be related to differential pressure, although "structural damage" suggests excessive structural loads.

j. Hazards related to pressure may be more properly related to differential pressure. Line or hose whipping may not be hazardous unless the affected line damages another component by imposing excessive structural loads. System leaks are treated separately in the composite hazards. Rapid heating and cooling can be caused by heat sources or sinks, and aeroembolism, bends or "chokes" are results not only of differential pressure but also of unsafe working conditions such as improper decompression or atmospheric composition. The term "shock" suggests electrical system malfunction.

k. Radiation hazards include thermal radiation which is separately treated in the composite hazards as heat sources. Radiation of any sort which is sufficient to damage human tissue is an unsafe working environment, and electrical interference can be caused by lightning. Decomposition of hydrocarbons and ozone or nitrogen oxide generation are usually caused by chemical, not electromagnetic, activity.

l. Thermal hazards are essentially due to high heat sources, although other reactions can be initiated by chemical activity, parts can be distorted by structural loads, pressure may cause fluid volume changes, and liquid compound stratification depends upon the nature of the liquid. Thermal effects which cause injury are unsafe working conditions.

m. The effects of toxicants listed are all also effects of unsafe or unhygienic working conditions.

n. Hazards involving vibration or sound are listed in the composite hazard list, although shock waves may be caused by differential pressure, loosening of parts by structural loads, and display impairment by operator error. Conditions which cause fatigue or communcation interference are considered unsafe working conditions.

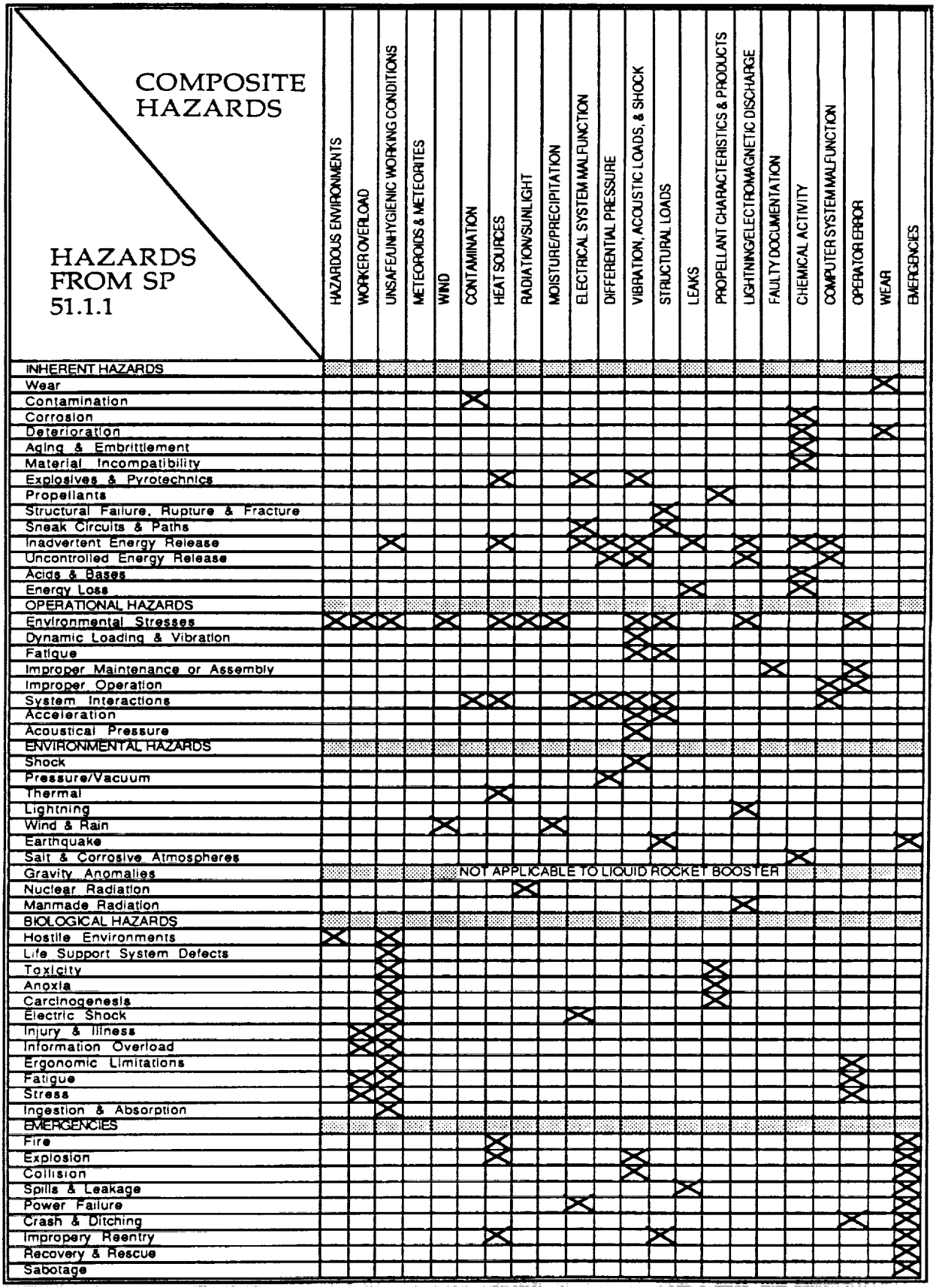
15. IDENTIFICATION MATRIX HAZARDS - The list of composite hazards may be compared to the hazard identification matrix from SP 51.1.1 to insure that all of the hazards listed in the index are considered in the composite hazard list. This is done in the matrices on the next two pages.

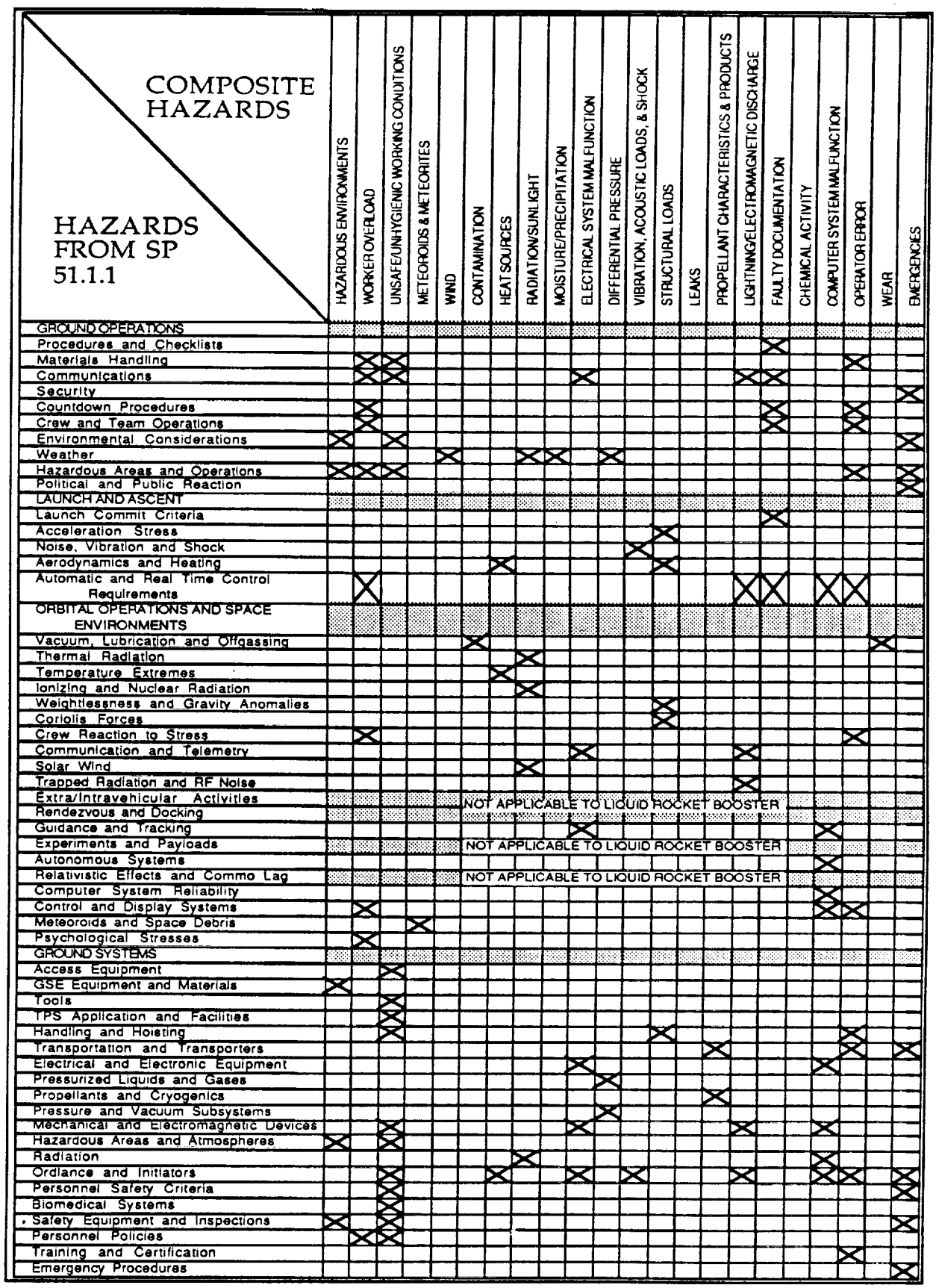
a. Inherent hazards are those which are normally considered hazardous when applied to any system, such as wear, contamination, chemical activity resulting in corrosion, aging or embrittlement, structural failure resulting from excessive loads, propellants and chemical activity caused by acid and base combination or other material incompatibility, all of which are treated as separate items in the composite hazard list. Deterioration can be caused by chemical activity or wear, and explosives and pyrotechnics can be detonated inadvertently by high heat sources, electrical malfunction, or shock. Sneak circuits and paths can apply to electrical function or unintended structural loads. Inadvertent energy release can be caused by unsafe working conditions, heat sources, electrical malfunction, differential pressure, mechanical shock, leaks, lightning, chemical activity, or by inadvertent operation of an energy-producing device by a malfunctioning computer system. This energy release may become uncontrollable if it results from pressure, mechanical shock, lightning, or computer malfunction. On the other hand, energy may be lost through leaks or chemical activity which dilutes or degrades the chemicals involved.

b. Operational hazards include environmental stresses such as hazardous environments, worker overload, unsafe working conditions, wind, heat sources, sunlight, moisture, vibration, structural loads (mechanical stress), electromagnetic effects, and operator errors. Dynamic loading and vibration are treated as vibration, acoustic loads and shock in the composite hazard list, and fatigue is considered from the point of view of repeated stress due to vibration or continual stress caused by structural loads. Improper maintenance or assembly is considered to be due to faulty documentation or operator error, whereas improper operation may be due to an operator or a computerized system error. System interactions include conditions such as contamination, heat sources, electrical malfunctions, differential pressures, shock, and imposition of loads on one structure by another. Adverse system interactions can also result from computer malfunction. Acceleration is considered from the loads, both dynamic and static, that it imposes on structures.

c. The environmental hazards of shock, pressure/vacuum, thermal, lightning, wind, rain (precipitation), corrosive atmospheres (chemical activity), radiation and manmade radiation (electromagnetic discharge) are all treated separately in the composite hazard list. Earthquake is considered as an emergency which can cause unsafe structural loads. Gravity anomalies are not considered to be applicable to the liquid rocket booster

d. All of the biological hazards listed in SP 51.1.1 are considered to be unsafe working conditions. Hostile environments are by definition hazardous environments, and toxicity, anoxia, and carcinogenesis are potential characteristics of propellants proposed for the LRB. Electric shock can result from electrical system malfunction,


COMPOSITE HAZARDS
HAZARDS FROM SP 51.1.1
HAZARDOUS ENVIRONMENTS
WORKER OVERLOAD
UNSAFE/UNHYGIENIC WORKING CONDITIONS
METEOROIDS & METEORITES
WIND
CONTAMINATION
HEAT SOURCES
RADIATION/SUNLIGHT
MOISTURE/PRECIPITATION
ELECTRICAL SYSTEM MALFUNCTION
DIFFERENTIAL PRESSURE
VIBRATION, ACOUSTIC LOADS, & SHOCK
STRUCTURAL LOADS
LEAKS
PROPELLANT CHARACTERISTICS & PRODUCTS
LIGHTNING/ELECTROMAGNETIC DISCHARGE
FAULTY DOCUMENTATION
CHEMICAL ACTIVITY
COMPUTER SYSTEM MALFUNCTION
OPERATOR ERROR
WEAR
EMERGENCIES
INHERENT HAZARDS
Wear
Contamination
Corrosion
Deterioration
Aging & Embrittlement
Material Incompatibility
Explosives & Pyrotechnics
Propellants
Structural Failure, Rupture & Fracture
Sneak Circuits & Paths
Inadvertent Energy Release
Uncontrolled Energy Release
Acids & Bases
Energy Loss
OPERATIONAL HAZARDS
Environmental Stresses
Dynamic Loading & Vibration
Fatigue
Improper Maintenance or Assembly
Improper Operation
System Interactions
Acceleration
Acoustical Pressure
ENVIRONMENTAL HAZARDS
Shock
Pressure/Vacuum
Thermal
Lightning
Wind & Rain
Earthquake
Salt & Corrosive Atmospheres
Gravity Anomalies
NOT APPLICABLE TO LIQUID ROCKET BOOSTER
Nuclear Radiation
Manmade Radiation
BIOLOGICAL HAZARDS
Hostile Environments
Life Support System Defects
Toxicity
Anoxia
Carcinogenesis
Electric Shock
Injury & Illness
Information Overload
Ergonomic Limitations
Fatigue
Stress
Ingestion & Absorption
EMERGENCIES
Fire
Explosion
Collision
Spills & Leakage
Power Failure
Crash & Ditching
Improper Reentry
Recovery & Rescue
Sabotage


COMPOSITE HAZARDS
HAZARDS FROM SP 51.1.1
HAZARDOUS ENVIRONMENTS
WORKER OVERLOAD
UNSAFE/UNHYGIENIC WORKING CONDITIONS
METEOROIDS & METEORITES
WIND
CONTAMINATION
HEAT SOURCES
RADIATION/SUNLIGHT
MOISTURE/PRECIPITATION
ELECTRICAL SYSTEM MALFUNCTION
DIFFERENTIAL PRESSURE
VIBRATION, ACOUSTIC LOADS, & SHOCK
STRUCTURAL LOADS
LEAKS
PROPELLANT CHARACTERISTICS & PRODUCTS
LIGHTNING/ELECTROMAGNETIC DISCHARGE
FAULTY DOCUMENTATION
CHEMICAL ACTIVITY
COMPUTER SYSTEM MALFUNCTION
OPERATOR ERROR
WEAR
EMERGENCIES
GROUND OPERATIONS
Procedures and Checklists
Materials Handling
Communications
Security
Countdown Procedures
Crew and Team Operations
Environmental Considerations
Weather
Hazardous Areas and Operations
Political and Public Reaction
LAUNCH AND ASCENT
Launch Commit Criteria
Acceleration Stress
Noise, Vibration and Shock
Aerodynamics and Heating
Automatic and Real Time Control Requirements
ORBITAL OPERATIONS AND SPACE ENVIRONMENTS
Vacuum, Lubrication and Offgassing
Thermal Radiation
Temperature Extremes
Ionizing and Nuclear Radiation
Weightlessness and Gravity Anomalies
Coriolis Forces
Crew Reaction to Stress
Communication and Telemetry
Solar Wind
Trapped Radiation and RF Noise
Extra/Intravehicular Activities
Rendezvous and Docking
Guidance and Tracking
Experiments and Payloads
Autonomous Systems
Relativistic Effects and Commo Lag
Computer System Reliability
Control and Display Systems
Meteoroids and Space Debris
Psychological Stresses
GROUND SYSTEMS
Access Equipment
GSE Equipment and Materials
Tools
TPS Application and Facilities
Handling and Hoisting
Transportation and Transporters
Electrical and Electronic Equipment
Pressurized Liquids and Gases
Propellants and Cryogenics
Pressure and Vacuum Subsystems
Mechanical and Electromagnetic Devices
Hazardous Areas and Atmospheres
Radiation
Ordiance and Initiators
Personnel Safety Criteria
Biomedical Systems
Safety Equipment and Inspections
Personnel Policies
Training and Certification
Emergency Procedures
NOT APPLICABLE TO LIQUID ROCKET BOOSTER
NOT APPLICABLE TO LIQUID ROCKET BOOSTER
NOT APPLICABLE TO LIQUID ROCKET BOOSTER

while injury, illness, information overload, fatigue, and stress can all contribute to worker overload. Ergonomic limitations, fatigue and stress may also cause hazards due to operator error.

e. All of the emergencies listed are considered under the composite hazard called emergencies. In addition, fire, explosion and improper reentry are considered to be heat sources, while explosion and collision can cause hazardous mechanical shock. Spills and leakage and electrical power failure are treated as separate items in the composite hazard list. Crash and ditching are considered to be due, at least potentially, to operator error, while improper entry can cause adverst structural loads as well as intolerable heating.

f. Ground operations include those activities which are governed by written procedures and checklists, which can introduce hazards if these documents are not correctly written. Materials handling can be adversely affected by worker overload, unsafe working conditions, and operator error. Communications can also suffer from worker overload, unsafe (noisy) working conditions, failure of the system powering electronic communications, lightning and other electromagnetic noise, and potential mistakes caused by erroneous communication procedures. Security could be compromised during an emergency, and countdown procedures and operations of crews or teams can be adversely affected by worker overload, faulty procedural documents, and operator errors. Environmental considerations are jeopardized by hazardous environments, unsafe working conditions, or emergencies such as leaks or spills. Wind, sunlight, precipitation and barometric pressure changes are all aspects of weather which must be considered. Hazardous areas and operations are hazardous environments by definition, and make worker overload, unsafe working conditions, operator error and emergencies especially hazardous. Finally, political and public reaction may increase the hazard of an emergency.

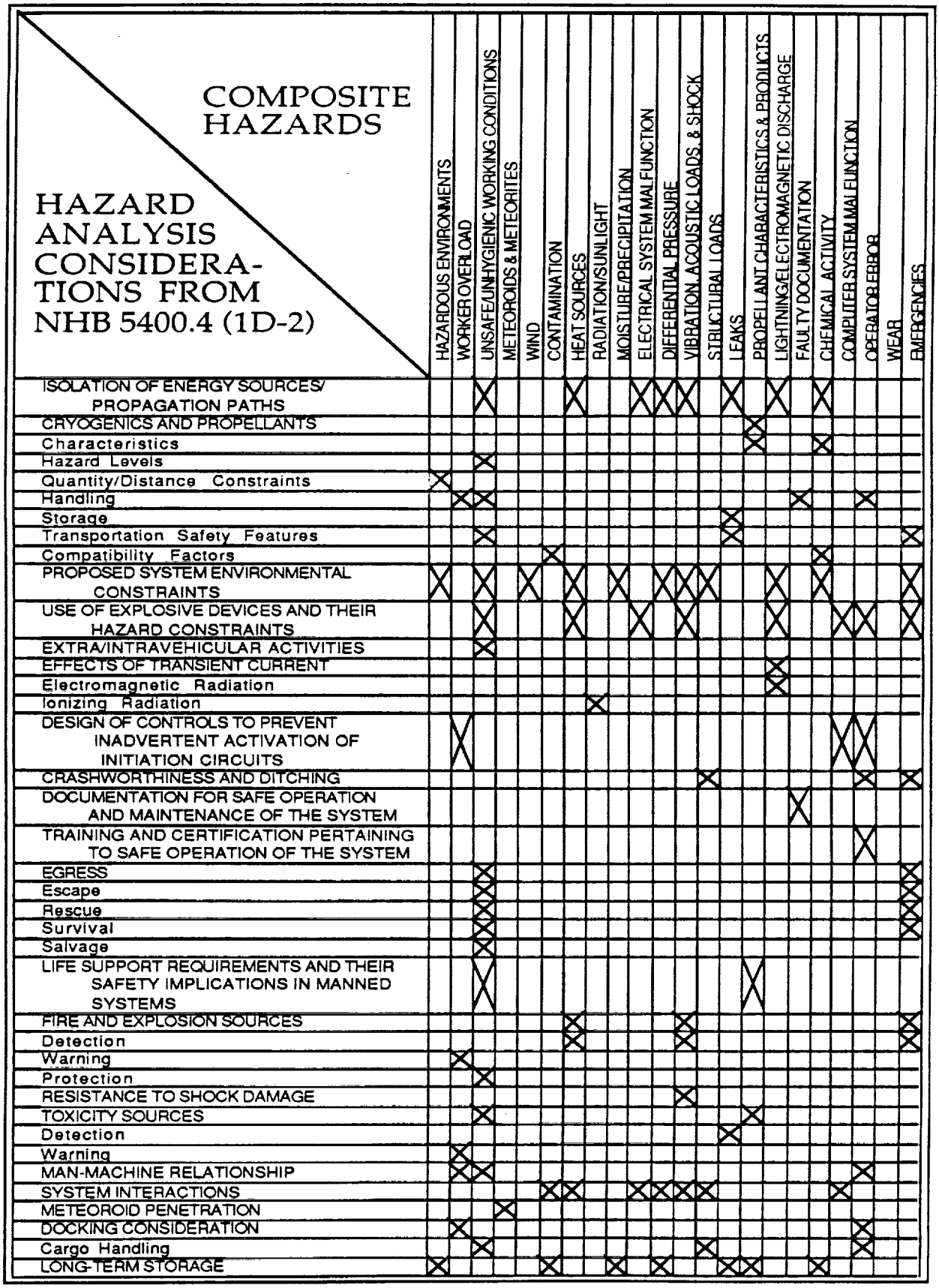
g. During launch and ascent, launch commit criteria can be particularly hazardous if errors are contained in the documentation. Acceleration stress, especially that encountered during an in-flight abort, may impose hazardous loads on the structure. Noise, vibration and shock are treated as a separate composite hazard. Aerodynamics and heating can impose high heat or structural loads. Finally, automatic or real time control requirements can suffer from worker overload, noise or electromagnetic interference from lightning, faulty documentation, computer malfunction, or operator error.

h. Although the LRB will not go into orbit, lubrication can be adversely affected by contamination, and thermal radiation from sunlight will be essentially unfiltered at apogee. Temperature extremes may be imposed by heat sources such as hot motor parts. The only source of ionizing radiation is sunshine at altitudes of interest. The ballistic trajectory of the LRBs after separation will change structural loading, which will also be influenced by coriolis forces imposed if the spent boosters tumble. Crew reaction to stress is impaired by worker overload, and may make operator error more likely. Communication and telemetry may be jeopardized by electrical malfunction or

static due to lightning. Solar wind is treated under radiation/sunlight, and trapped radiation and RF noise is treated under electromagnetic discharge. Guidance andtracking may be adversely affected by electrical malfunction, and autonomous systems will be adversely affected by computer malfunction, as will computer system reliability. Control and display systems will also be impaired by computer system malfunction, as well as worker overload and operator error, which may cause erroneous control inputs or misinterpretation of displays. Meteoroids and space debris are treated as a separate item in the composite hazards, and psychological stresses are considered to be sources of worker overload. Extra/intravehicular activities on orbit, rendezvous and docking, experiments and payloads, and relativistic effects are not considered to be applicable to the LRB.

i. Ground systems interfacing to the LRB are largely undefined, however certain hazards may be assumed from the hazard identification index. Among these are unsafe working conditions caused by poorly designed access equipment, hazardous environments caused by GSE, and unsafe working conditions caused by unsafe tools or TPS application facilities. Handling and hoisting equipment and operations may be hazardous due to unsafe working conditions, structural loads, or operator error. Transportation of propellants may introduce unique dangers, including the requirement to deal with emergencies or operator errors. Electronic equipment may cause hazards due to malfunction or computer error. Pressure of liquids and gases is considered as a separate composite hazard, as is the hazard posed by propellant characteristics or products, including cryogenic propellants. Pressure and vacuum systems cause hazards due to differential pressure, while mechanical and electromagnetic devices may cause unsafe working conditions, electrical system malfunction, electromagnetic discharge, or computer errors. Hazardous areas and atmospheres are hazardous environments as well as unsafe working conditions, and radiation from sunlight or lightning discharge may introduce additional hazards. Ordnance and initiators may cause hazards due to the proximity of workers (which may pose an unsafe working condition), heat sources, electrical system malfunction, the possibility of mechanical shock, lightning strike, computer error, operator error, or emergencies such as fire. Requirements for personal safety criteria are implicit in consideration of unsafe working conditions, and must provide for emergencies such as sudden incapacitation. Such equipment may include biomedical monitoring of launch crew members required to detect their exposure to unsafe working conditions. Safety equipment and inspections are required where hazardous environments, unsafe working conditions, or the possibility of emergency evacuation or rescue is a concern. These may be augmented by personnel policies which deal with prevention of worker overload or exposure to unsafe working conditions. Training and certification are required to reduce the hazard of operator error, and emergency procedures are required for all credible emergencies.

16. HAZARD CONSIDERATIONS FROM NHB 5300.4 (1D-2) - The final hazard comparison list compares the composite hazards previously identified with the requirements from NHB 5300.4 (1D-2) listed in paragraph 8. This comparison is shown in the matrix on the following page, and is described beginning on page 30.


COMPOSITE HAZARDS
HAZARD ANALYSIS CONSIDERA-TIONS FROM NHB 5400.4 (1D-2)
HAZARDOUS ENVIRONMENTS
WORKER OVERLOAD
UNSAFE/UNHYGIENIC WORKING CONDITIONS
METEOROIDS & METEORITES
WIND
CONTAMINATION
HEAT SOURCES
RADIATION/SUNLIGHT
MOISTURE/PRECIPITATION
ELECTRICAL SYSTEM MALFUNCTION
DIFFERENTIAL PRESSURE
VIBRATION, ACOUSTIC LOADS, & SHOCK
STRUCTURAL LOADS
LEAKS
PROPELLANT CHARACTERISTICS & PRODUCTS
LIGHTNING/ELECTROMAGNETIC DISCHARGE
FAULTY DOCUMENTATION
CHEMICAL ACTIVITY
COMPUTER SYSTEM MALFUNCTION
OPERATOR ERROR
WEAR
EMERGENCIES
ISOLATION OF ENERGY SOURCES/ PROPAGATION PATHS
CRYOGENICS AND PROPELLANTS
Characteristics
Hazard Levels
Quantity/Distance Constraints
Handling
Storage
Transportation Safety Features
Compatibility Factors
PROPOSED SYSTEM ENVIRONMENTAL CONSTRAINTS
USE OF EXPLOSIVE DEVICES AND THEIR HAZARD CONSTRAINTS
EXTRA/INTRAVEHICULAR ACTIVITIES
EFFECTS OF TRANSIENT CURRENT
Electromagnetic Radiation
Ionizing Radiation
DESIGN OF CONTROLS TO PREVENT INADVERTENT ACTIVATION OF INITIATION CIRCUITS
CRASHWORTHINESS AND DITCHING
DOCUMENTATION FOR SAFE OPERATION AND MAINTENANCE OF THE SYSTEM
TRAINING AND CERTIFICATION PERTAINING TO SAFE OPERATION OF THE SYSTEM
EGRESS
Escape
Rescue
Survival
Salvage
LIFE SUPPORT REQUIREMENTS AND THEIR SAFETY IMPLICATIONS IN MANNED SYSTEMS
FIRE AND EXPLOSION SOURCES
Detection
Warning
Protection
RESISTANCE TO SHOCK DAMAGE
TOXICITY SOURCES
Detection
Warning
MAN-MACHINE RELATIONSHIP
SYSTEM INTERACTIONS
METEOROID PENETRATION
DOCKING CONSIDERATION
Cargo Handling
LONG-TERM STORAGE

a. Isolation of energy sources and propagation paths is necessary where such sources could create hazardous working conditions. These sources include heat sources, malfunctioning electrical systems, pressure differentials, sources of vibration and shock, leaks, electromagnetic discharges, and reactive chemicals.

b. Cryogenics and propellants are listed as a separate item in the composite hazard list, however, their characteristics include not only their characteristics as propellants, but also as reactive chemicals. Hazard levels are related to the hazard posed in the workplace, while quantity/distance constraints delineate the extent of the hazardous area or environment around these fluids. Handling propellants is a demanding, hazardous task which can cause worker overload and unsafe working conditions. Faulty work documents or operator error when handling propellants can cause extreme hazards. The main hazard during storage is leakage, which is also a concern during transportation, when such leakage can create hazardous working conditions and a possible emergency. Finally, compatibility factors are of concern due to possible contamination of the propellant or chemical reaction between the propellant and other chemicals.

c. Proposed system environmental constraints are governed by concerns regarding the hazardous environment or working conditions created, wind tolerance of transportation equipment, the effect of heat, precipitation and barometric pressure on a system, and possible vibration or structural loads which may be applied. The effects of lightning, proximity of chemicals, and reaction to emergencies must also be considered.

d. The use of explosive devices immediately dictates the requirement to deal with working conditions around them, possible ignition from heat sources, electrical (test and checkout equipment) malfunction, and the possiblity of mechanical shock. Electrically operated explosive systems must be protected against detonation by lightning or other electromagnetic discharge, computer system malfunction, or operator error. Finally, emergency plans must be made to deal with the possible consequences of mishandling or inadvertent detonation.

e. Extra- or intravehicular activities would be performed by work crews on the pad. These activities would be made hazardous by the existence of unsafe working conditions.

f. The most hazardous effects of transient current would be those produced by lightning, which would produce electromagnetic radiation. Ionizing radiation is treated along with sunlight as a possible hazard in the composite hazard list.

g. Design of controls to prevent inadvertent circuit activation is intended to counteract the hazards of worker overload, computer malfunction, or operator error.

h. Hazards of interest in crashworthiness and ditching are the imposition of structural loads, cause by operator error, and the resulting emergency.

i. Faulty documentation is the hazard of concern regarding documentation for safe system operation and maintenance.

j. Training and certification is required to guard against the hazard of operator error.

k. Egress, escape, rescue, survival and salvage with respect to the LRB all pertain to unsafe working condtions and possible emergency conditions resulting therefrom.

l. Life support requirements pertain to ground crews, and may be of concern in mitigating the hazard of unsafe workplaces. The greatest hazard is from propellant handling, which may require special life support systems such as self contained atmosphere protective ensemble (SCAPE) equipment.

m. Fire and explosion sources are heat and shock, both of which may be the cause of, or may be caused by, an emergency situation. Detection of these sources therefore requires detection of the heat, shock or emergency situation of concern. Warning systems may contribute to worker overload, and protection requirements for personnel are essentially protection from unsafe working conditions.

n. Resistance to shock damage deals with mechanical shock or vibration.

o. Toxicity sources pose the hazard of unsafe working conditions. Propellant characteristics are the chief concern. Detection will serve mainly to mitigate the hazard of toxic leakage. Frequent, excessive or annoying warning systems may contribute to worker overload.

p. Hazards of worker overload and the possibility of unsafe working conditions must be taken into consideration in considering man-machine relationships. Design of manual controls should attempt to minimize the hazard of operator error.

q. Systems interactions can be of various kinds. Hazards suggested are contamination of one fluid medium by another or by its container, heat leakage, electrical malfunctions, pressure effects, vibration, structural loads, and computer system malfunction.

r. Meteoroids are treated as a separate hazard in the composite list.

s. Docking considerations with respect to the LRB pertain to transportation. Hazards of concern are worker overload and operator error. Cargo handling may create unsafe working conditions, which can lead to the imposition of unsafe structural loads, or can cause or be caused by operator error.

t. Hazards involved in long term storage are potentially hazardous storage environments, which can have adverse effects on the product or material stored

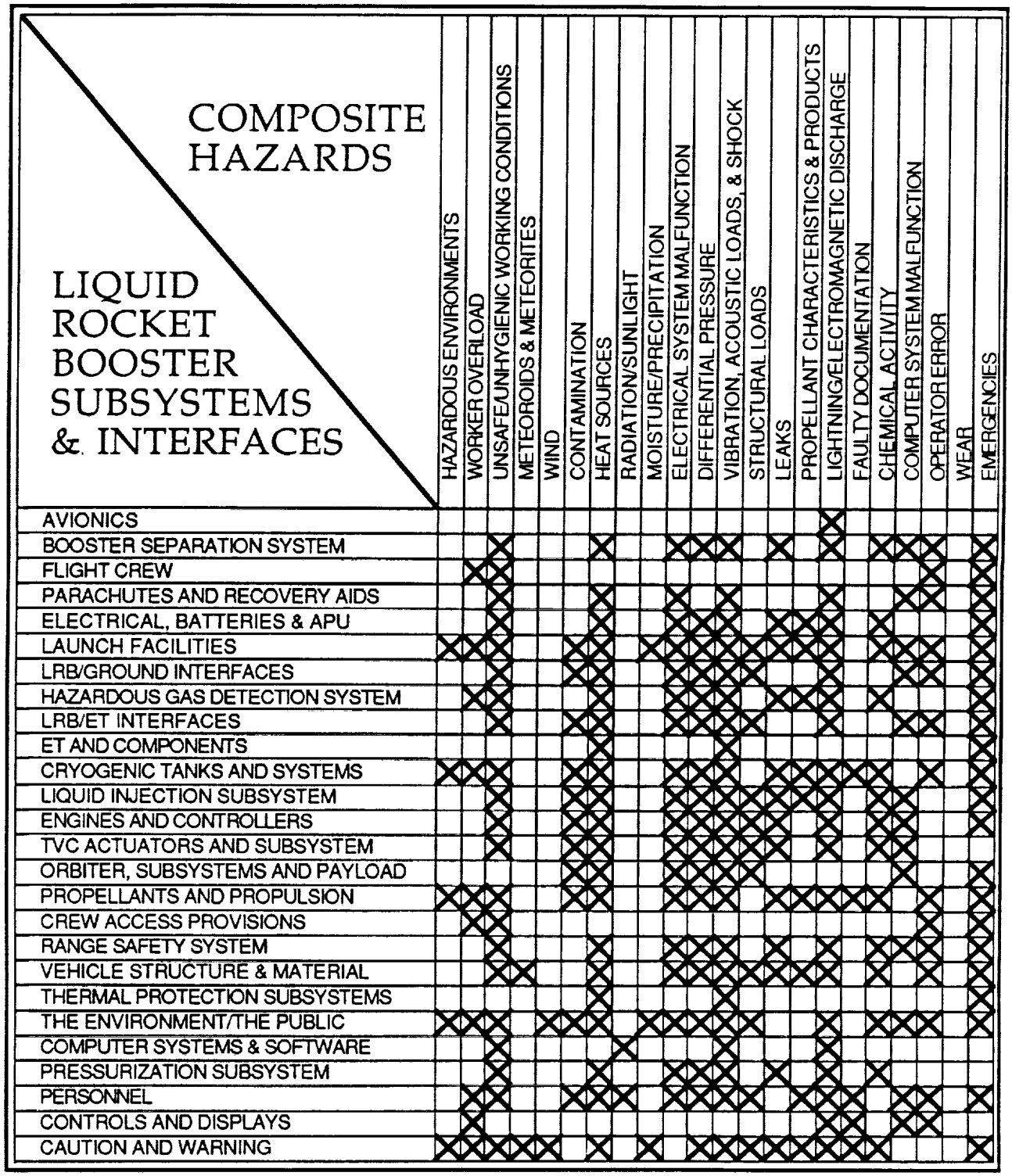
because of contamination, moisture, and pressure differentials. The possibility of leaks, deteioration pecular to propellants, or chemical reaction must be guarded against.

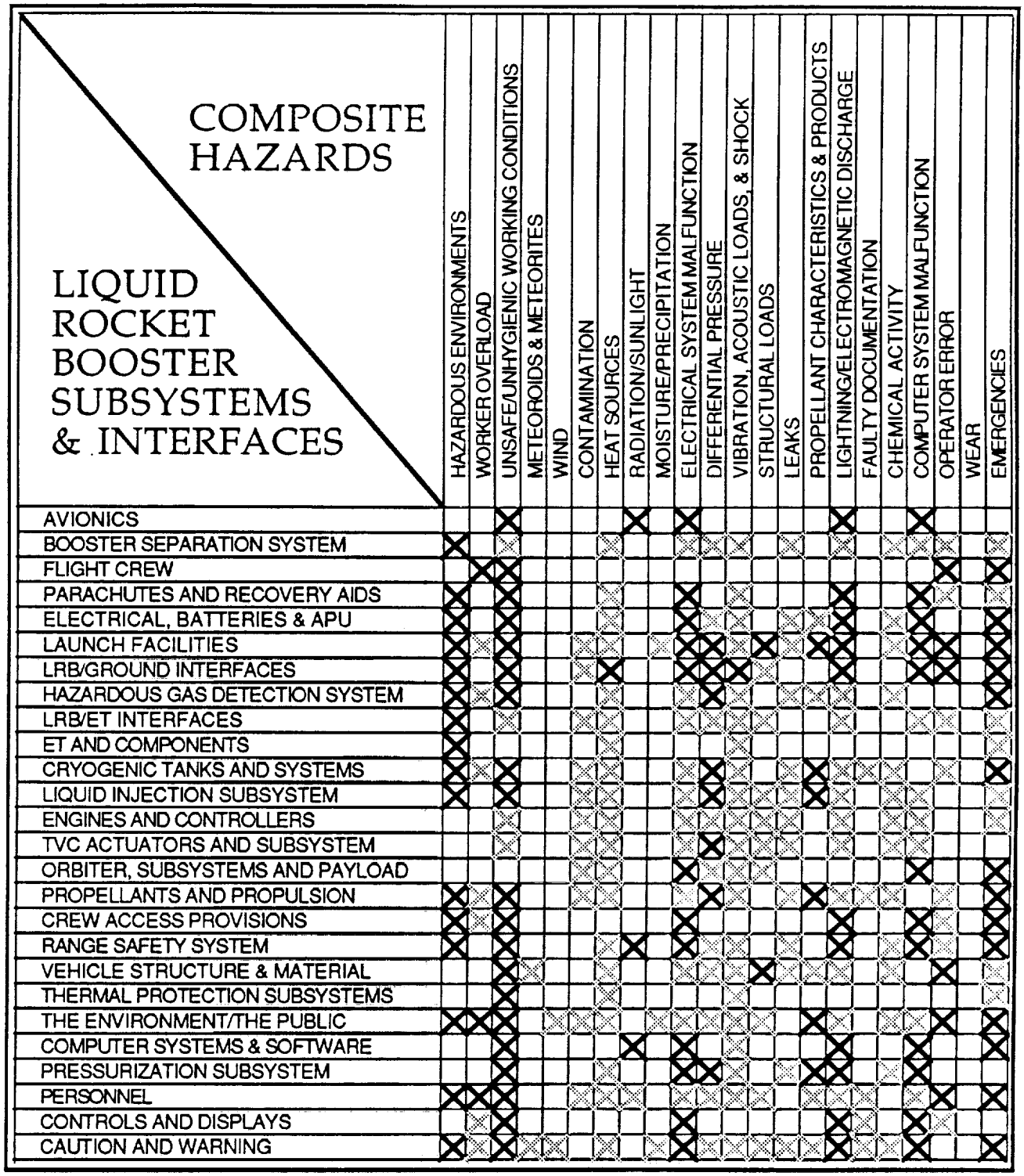
17. SYSTEM/COMPOSITE HAZARD COMPARISONS - At this point, it is possible to begin the systematic process of analyzing hazards with respect to of the systems in which they may be considered a concern. A comprehensive analysis process requires that each system be analyzed for the potential existence of each of the composite hazards identified. The first step is to focus the area of concern by identifying hazards and systems which have various considerations in common. A preliminary system/hazard matrix will be developed using this procedure.

a. Common considerations from NHB 5300.4 (1D-2) are shown in the matrices on pages 7 and 29. The comparison technique begins with selection of a single system from the top of page 7, and noting all of the hazard analysis considerations from NHB 5300.4 (1D-2) which pertain to it, as indicated by the matrix. Entries in the matrix are described in paragraph 9. As each consideration is identified, the same consideration is found on page 29, and the hazards which correspond to it are noted. The relationship between considerations and hazards is explained in paragraph 16. Each of these hazards is then associated with the selected system as indicated by entries in the matrix on page 33. For example, the hazard analysis considerations associated with avionics are effects of transient current and electromagnetic radiation, as shown on page 7. These two considerations are associated with the composite hazard, lightning/electromagnetic discharge, as shown on page 29. This hazard is therefore associated with avionics as shown in the matrix on the next page. Entries were made in a similar manner until the matrix was completed, as shown.

b. Another similar comparison can be made betwen the systems listed on page 10 and the hazards listed on page 26, linking them using the ground systems entries from the SP 51.1.1 hazard identification checklist. The correspondences between the systems and hazards are indicated by the bold entries on page 34. The previous entries which do not overlap the new ones have been subdued for clarity.

c. The entries made in the preceding two steps focus concern on relationships suggested by their common considerations, but do not, by themselves, indicate which hazards pertain to which systems. These are therefore guidelines for the analyst, to focus attention on the intersections indicated. The next step in the process is to determine, by examination of each of the combinations indicated, if the system actually can be jeopardized by or can cause the hazards shown. For example, the hazard of unsafe or unhygienic working conditions does not appear to apply to avionics, which are manufactured under clean room conditions and which, when operating, do not present a hazard to workers. Another condition is that one combination indicated in the matrix may duplicate another, indicating essentially the same hazard. An examination of the entries on page 34 indicates that there are a number of these non-credible combinations. They are indicated by circles in the matrix on page 35. The numbers in the circles are explained as follows:


COMPOSITE HAZARDS
LIQUID ROCKET BOOSTER SUBSYSTEMS & INTERFACES
HAZARDOUS ENVIRONMENTS
WORKER OVERLOAD
UNSAFE/UNHYGIENIC WORKING CONDITIONS
METEOROIDS & METEORITES
WIND
CONTAMINATION
HEAT SOURCES
RADIATION/SUNLIGHT
MOISTURE/PRECIPITATION
ELECTRICAL SYSTEM MALFUNCTION
DIFFERENTIAL PRESSURE
VIBRATION, ACOUSTIC LOADS, & SHOCK
STRUCTURAL LOADS
LEAKS
PROPELLANT CHARACTERISTICS & PRODUCTS
LIGHTNING/ELECTROMAGNETIC DISCHARGE
FAULTY DOCUMENTATION
CHEMICAL ACTIVITY
COMPUTER SYSTEM MALFUNCTION
OPERATOR ERROR
WEAR
EMERGENCIES
AVIONICS
BOOSTER SEPARATION SYSTEM
FLIGHT CREW
PARACHUTES AND RECOVERY AIDS
ELECTRICAL, BATTERIES & APU
LAUNCH FACILITIES
LRB/GROUND INTERFACES
HAZARDOUS GAS DETECTION SYSTEM
LRB/ET INTERFACES
ET AND COMPONENTS
CRYOGENIC TANKS AND SYSTEMS
LIQUID INJECTION SUBSYSTEM
ENGINES AND CONTROLLERS
TVC ACTUATORS AND SUBSYSTEM
ORBITER, SUBSYSTEMS AND PAYLOAD
PROPELLANTS AND PROPULSION
CREW ACCESS PROVISIONS
RANGE SAFETY SYSTEM
VEHICLE STRUCTURE & MATERIAL
THERMAL PROTECTION SUBSYSTEMS
THE ENVIRONMENT/THE PUBLIC
COMPUTER SYSTEMS & SOFTWARE
PRESSURIZATION SUBSYSTEM
PERSONNEL
CONTROLS AND DISPLAYS
CAUTION AND WARNING


COMPOSITE HAZARDS
LIQUID ROCKET BOOSTER SUBSYSTEMS & INTERFACES
HAZARDOUS ENVIRONMENTS
WORKER OVERLOAD
UNSAFE/UNHYGIENIC WORKING CONDITIONS
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ENGINES AND CONTROLLERS
TVC ACTUATORS AND SUBSYSTEM
ORBITER, SUBSYSTEMS AND PAYLOAD
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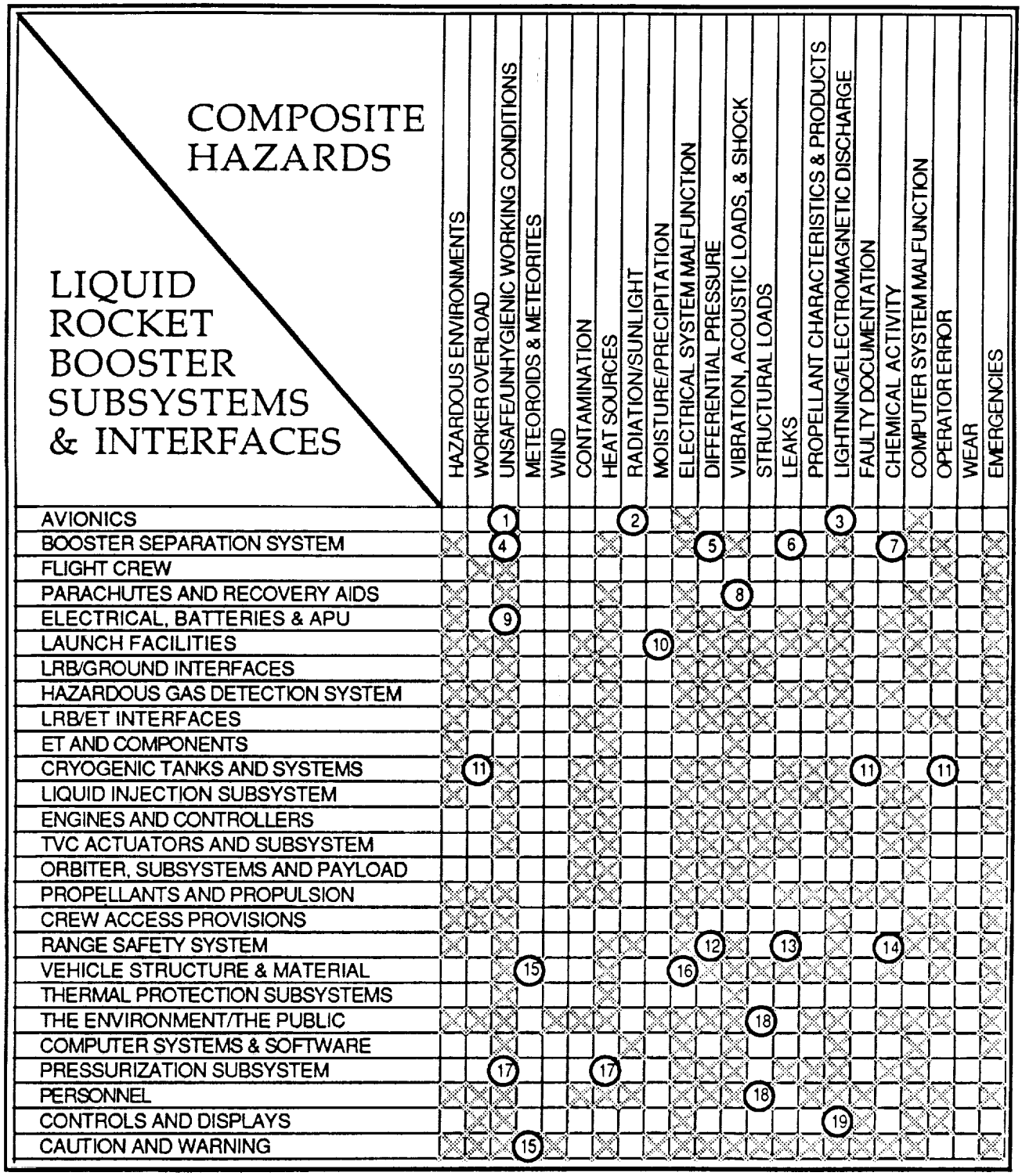
COMPUTER SYSTEMS & SOFTWARE
PRESSURIZATION SUBSYSTEM
PERSONNEL
CONTROLS AND DISPLAYS
CAUTION AND WARNING


COMPOSITE HAZARDS
LIQUID ROCKET BOOSTER SUBSYSTEMS & INTERFACES
HAZARDOUS ENVIRONMENTS
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ET AND COMPONENTS
CRYOGENIC TANKS AND SYSTEMS
LIQUID INJECTION SUBSYSTEM
ENGINES AND CONTROLLERS
TVC ACTUATORS AND SUBSYSTEM
ORBITER, SUBSYSTEMS AND PAYLOAD
PROPELLANTS AND PROPULSION
CREW ACCESS PROVISIONS
RANGE SAFETY SYSTEM
VEHICLE STRUCTURE & MATERIAL
THERMAL PROTECTION SUBSYSTEMS
THE ENVIRONMENT/THE PUBLIC
COMPUTER SYSTEMS & SOFTWARE
PRESSURIZATION SUBSYSTEM
PERSONNEL
CONTROLS AND DISPLAYS
CAUTION AND WARNING

(1) The inappropriate combination of avionics and unsafe working conditions has already been noted. There does not appear to be any credible means by which avionics can cause or be jeopardized by unsafe working conditions.

(2) Radiation is not a likely source of damage to avionics, with the possible exception of computerized systems, in which one or more bits of memory can be changed by cosmic rays. This situation is actually a computer system malfunction, which is an acknowledged hazard to avionics. Therefore, this hazard duplicates the later entry.

(3) Likewise, avionics are not likely to be harmed by lightning strike, and certainly cannot cause it. However, a lightning discharge can cause an electrical malfunction, which is indicated as a hazard to electronics. Therefore, this hazard is redundant.

(4) Any unsafe working conditions which could be caused by the booster separation system would be due to the hazardous environment created by this system, which is a pyrotechnic device. The hazard of hazardous environments is already entered in the matrix. Furthermore, it is not likely that the booster separation system can be harmed by unsafe working conditions, so this entry is also redundant.

(5) The booster separation is not likely to be jeopardized by or to cause differential pressure except at the moment of firing, when the pressure produced is a normal non-hazardous event. It is possible that the exhaust from this system could harm the ET, but this is a LRB/ET interface problem and is noted in the matrix under that catagory. This hazard is therefore either redundant or not credible, and should be deleted in either case.

(6) The booster separation system is a solid system which is sealed until use. For this reason, this system is neither a producer nor vulnerable to leaks. This hazard is therefore not credible.

(7) Solid rocket motors are extremely stable chemically. For this reason, chemical activity is not a credible hazard.

(8) Parachutes and recovery aids are mature technology and have been used since the very earliest days of manned spaceflight with an excellent history of safety and reliability. These systems will be qualified to their use environment on the LRB, and therefore can be relied upon to perform properly. The shock loads due to parachute opening are reliably calculated and verified. For this reason, this combination is not a credible hazard.

(9) Unsafe working conditions caused by the electrical system of the LRB are due exclusively to the hazardous environments produced. Since these are already covered, this hazard combination is redundant.

(10) Precipitation and moisture at the launch site is calculated using historical data, and launch site equipment and facilities are designed with large margins of safety to withstand this environment. Therefore, this combination is not a credible hazard.

(11) Cryogenic tanks and systems are not likely to cause or be affected by worker overload, faulty documentation or operator error more than any other system. This hazard is therefore redundant because it duplicates these hazards associated with the flight crew and other personnel.

(12) There is no component of the range safety system which is particularly affected by differential pressure. This hazard is therefore not credible.

(13) The RSS is not affected by leaks except for the batteries, which may be considered generically along with other batteries in the electrical system. Since this hazard is already covered for that subsystem, this hazard is redundant.

(14) Similarly, the RSS components are stable chemically. This hazard is therefore not credible.

(15) The projected flight trajectory of the LRB will take it to a maximum of 250,000 feet, where meteors are no more hazardous than on the ground, where a meteor strike would be an emergency. Since emergencies are covered for both the vehicle structure and the caution and warning system, the hazard due to meteors is redundant. This consideration deletes an entire composite hazard catagory.

(16) Electrical system malfunction will not pose a hazard to the vehicle structure due to the extensive grounding employed and the low currents involved. The vehicle could be damaged during transportation by collision with a high voltage power distribution line, but this is a transportation operator error, not an electrical malfunction. Therefore, this hazard is not credible.

(17) The unsafe working conditions and hazard from heat sources with respect to the pressurization system are both due to the cryogenic nature of the pressurant. Since these hazards are already covered under cryogenic tanks and systems, these hazard combinations are redundant.

(18) Personnel are not likely to be harmed by structural loads unless these loads are released in some way, either because the structure carrying them is unable to safely carry the load, in which case the hazard is to vehicle structure, or some other structure fails, which is an emergency. Since both of the latter hazards are covered in the matrix, this hazard is redundant.

(19) Lightning will affect controls and displays only if it causes electrical malfunction, which is covered in the matrix. This hazard is therefore redundant.

18. SELECTION OF ADDITIONAL CATAGORIES - The preceding steps suggest, but do not guarantee, hazards from the composite hazard list which may pertain to each subsystem shown in the matrix. Other combinations are credible, and should be included in the PHA. At this stage of design maturity, selection of additional hazards to be investigated is largely a matter of judgement. While it is perhaps possible to envision a situation in which every hazard applies, certain combinations would require gross violation of engineering judgement in the design, extremely unlikely series of events, or deliberate violation of established criteria. Assuming that these unusual circumstances can be ignored for the time being, there remain several combinations of subsystems and hazards which are credible and which are indicated in the matrix on page 39, on which previously entered markings are again subdued. The rationale for selection of the new combinations is given below:

a. Avionics assemblies may be installed in the LRB during manufacture, which will subject them to heating, and acoustic loads during test firing which they would not experience in normal flight. Solid rocket booster avionics are not susceptible to these hazards, since they are not test fired prior to flight. Repeated immersion of avionics packages in seawater may pose a contamination hazard, and multiple flights may cause wear of gyroscope bearings. Finally, any major on-pad emergency could jeopardize the avionics packages.

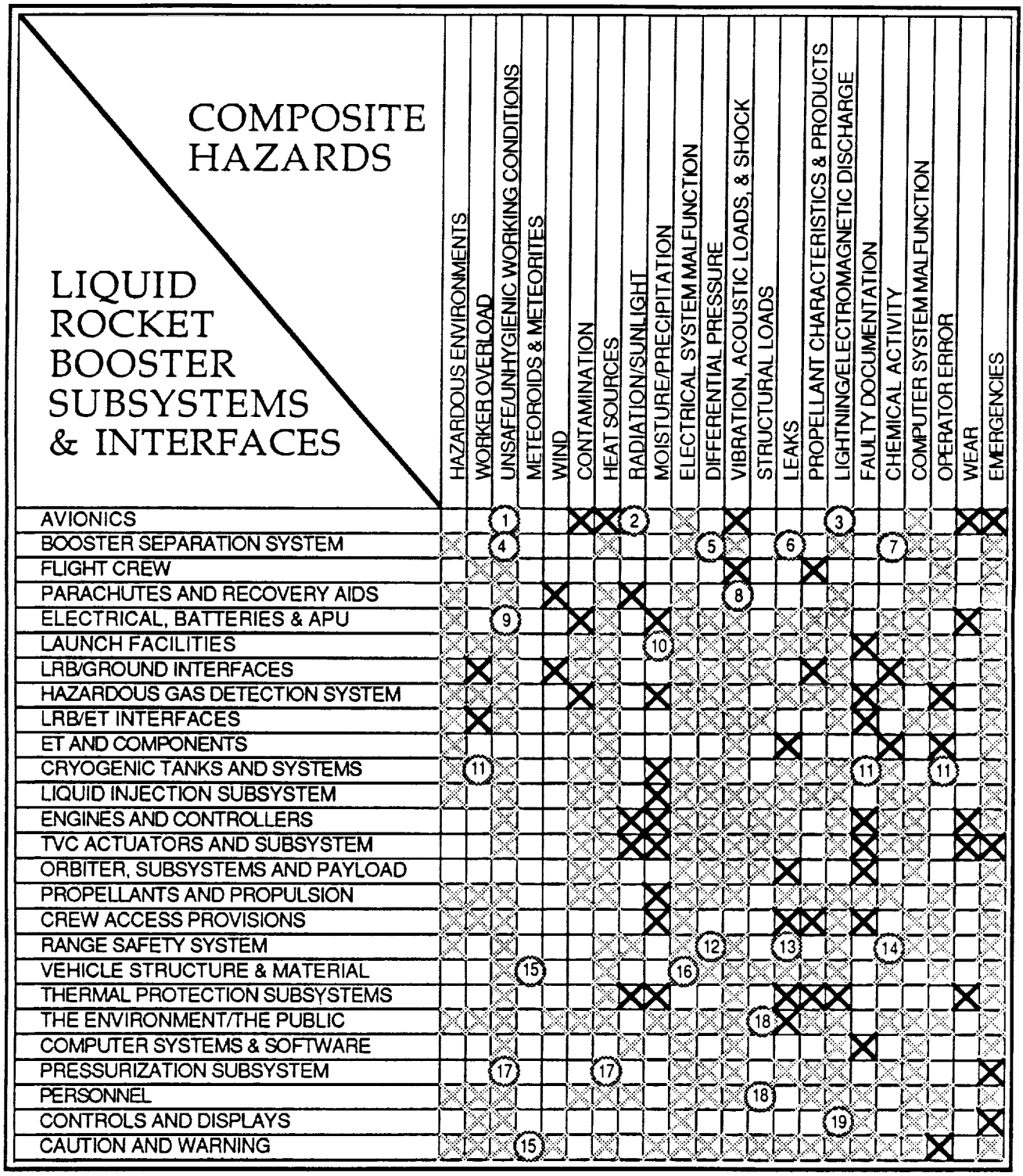
b. The acoustic en onment induced by the LRBs may be significantly different, and possibly more intense, than that currently experienced by the flight crew. If so, this additional vibration will represent an additional hazard against which they must be protected. In the event of a LRB leak or propellant spill during countdown, the flight crew will be jeopardized during their escape from the Orbiter by vapors or an on-pad fire.

c. Parachutes may be tangled by strong winds, or may be blown away from the splashdown area, making recovery impossible. Parachutes made of Kevlar™ aramid fabric can be damaged by exposure to ultraviolet radiation from sunlight.

d. Batteries and APUs may be damaged by contamination during test firing or by moisture from rain or seawater intrusion. Rotating bearings may be contaminated by seawater or may be degraded after repeated uses by bearing wear.

e. Use of LRBs will require major changes in procedures at the launch facility. Rewriting of these procedures introduces the hazard of documentation error which could cause major hazards during launch if these procedures are followed.

f. Ground support of the LRB will be significantly more complicated than for the SRBs, which will result in more tasks and a longer time for their completion. This poses a significant hazard of worker overload unless appropriate countermeasures are taken by the launch support contractors. Also, the LRBs, being larger than the SRBs, will be subjected to more stress by wind, and the launch pad may be jeopardized by these increased loads. The requirement for additional propellant


COMPOSITE HAZARDS
LIQUID ROCKET BOOSTER SUBSYSTEMS & INTERFACES
HAZARDOUS ENVIRONMENTS
WORKER OVERLOAD
UNSAFE/UNHYGIENIC WORKING CONDITIONS
METEOROIDS & METEORITES
WIND
CONTAMINATION
HEAT SOURCES
RADIATION/SUNLIGHT
MOISTURE/PRECIPITATION
ELECTRICAL SYSTEM MALFUNCTION
DIFFERENTIAL PRESSURE
VIBRATION, ACOUSTIC LOADS, & SHOCK
STRUCTURAL LOADS
LEAKS
PROPELLANT CHARACTERISTICS & PRODUCTS
LIGHTNING/ELECTROMAGNETIC DISCHARGE
FAULTY DOCUMENTATION
CHEMICAL ACTIVITY
COMPUTER SYSTEM MALFUNCTION
OPERATOR ERROR
WEAR
EMERGENCIES
AVIONICS
BOOSTER SEPARATION SYSTEM
FLIGHT CREW
PARACHUTES AND RECOVERY AIDS
ELECTRICAL, BATTERIES & APU
LAUNCH FACILITIES
LRB/GROUND INTERFACES
HAZARDOUS GAS DETECTION SYSTEM
LRB/ET INTERFACES
ET AND COMPONENTS
CRYOGENIC TANKS AND SYSTEMS
LIQUID INJECTION SUBSYSTEM
ENGINES AND CONTROLLERS
TVC ACTUATORS AND SUBSYSTEM
ORBITER, SUBSYSTEMS AND PAYLOAD
PROPELLANTS AND PROPULSION
CREW ACCESS PROVISIONS
RANGE SAFETY SYSTEM
VEHICLE STRUCTURE & MATERIAL
THERMAL PROTECTION SUBSYSTEMS
THE ENVIRONMENT/THE PUBLIC
COMPUTER SYSTEMS & SOFTWARE
PRESSURIZATION SUBSYSTEM
PERSONNEL
CONTROLS AND DISPLAYS
CAUTION AND WARNING

service for the LRBs will pose additioal hazards, as will the possibility of chemical reaction from propellant leaks, seeps or vapors.

g. Increased loading of the on-pad HGDS due to the requirement to support the LRBs will result in increased hazard of contamination or moisture intrusion into the system. Requirements to monitor a larger number of propellants will require revision of the procedures for use of this instrumentation, introducing the possibility of error in the documentation and operator error.

h. Differences in interface closeouts between the SRB and LRB may make it more difficult to perform the necessary tasks, leading to worker overload and possible hazards due to errors in procedural documents, many of which will have to be completely rewritten to accommodate the new tasks.

i. Propellant leaks, which are not a problem with the SRB, could endanger an ET attached to fueled LRBs. Vapors from propellants may be harmful to ET materials or the TPS. Finally, the necessity to fuel both the ET and LRB on the pad may complicate ET loading procedures, leading to possible errors by the ET loading console operators.

j. Cryogenic systems in the LRB will become clogged by ice if moisture intrusion is not prevented. This includes not only moisture in the tanks, but also ice, and possibly liquid or frozen air, on the exterior of chilled components.

k. Not enough is known at this time about the effects of airborne moisture on the LITVC (if used) to know what hazards might be involved, but it appears prudent to consider hazards from rain, salt spray, or seawater intrusion.

l. At the present time, there is no requirement for engine controller electronics to be protected from the electromagnetic pulse associated with a nuclear event. This is an obvious hazard, which may become an accepted risk. Engine controllers immersed in seawater will be jeopardized by moisture intrusion, and engine turbine bearings may be harmed by water intrusion or wear from repeated use. Finally, the prelaunch procedures for engine preparation could contain errors which could cause hazards to the engines before or during launch.

m. The TVC acutation system is subject to the same hazards as the engines noted above. In addition, any major on-pad emergency could jeopardize this system as well as others.

n. The Orbiter may be jeopardized by LRB leaks, which are not currently possible with solid boosters. In addition, the requirement for additional on-board procedures as the result of the addition of LRB controls, displays and interface components in the Orbiter introduces the hazard of faulty documentation of checkout procedures.

o. It appears prudent to include moisture intrusion as a possible hazard in propulsion systems.

p. Access doors, panels and other openings can be sites for rainwater leakage or intrusion of seawater after splashdown. Provisions must be made for rapid crew evacuation in the event of propellant leaks or release of toxic or hazardous vapors. Finally, the possibility exists for danger introduced as the result of errors in drawings, instructions and specifications, and other documentation pertaining to the modified access platforms in the VAB required for the LRB.

q. At the present stage of concept maturity, there is no way of knowing what type, if any, of TPS would be required for the LRB. It appears prudent, however, to assume that the TPS could undergo possibly damaging chemical changes due to weathering (sunlight, rain) or chemical activity (leaks, propellant fumes) or abrasion (wear) from windblown sand or dust. Also, the possibility of localized heating and loss of adhesion due to lightning strike needs to be considered.

r. Any hazardous leaks should be considered a potential threat to both the public and the environment.

s. The requirement to program additional engine controllers, avionics and GPC and LPS systems to accommodate the LRBs introduces the possibility of program (documentation) errors.

t. Pressurization systems should be considered to be vulnerable to on-pad emergencies.

u. On-pad and other emergencies should be considered in the design of controls and displays which must operate under all conditions.

v. Caution and warning systems warn of impending hazards which must be dealt with by correct operator response.

19. FINAL SYSTEM/HAZARD MATRIX - The foregoing considerations result in the matrix shown on the next page, which is a matrix of the hazards, by system, to be considered in the PHA. In this matrix, the entries explained in paragraph 17 have been deleted. For each hazard not considered, a number has been entered in the matrix. This number will be used by the computerized program to indicate to the program that the numbered combinations will *not* be considered at this time. It should be noted that the fact that a system/hazard combination is not considered does not mean that no such hazard is possible. Deliberate deletion of a hazard from consideration may mean that the current lack of maturity of the system definition does not permit a realistic assessment of the hazard at this time.

20. LIFE CYCLE PHASES - The next step in the PHA is to examine the LRB life cycle phases to determine where in the life cycle selected composite hazards might

MATRIX 1

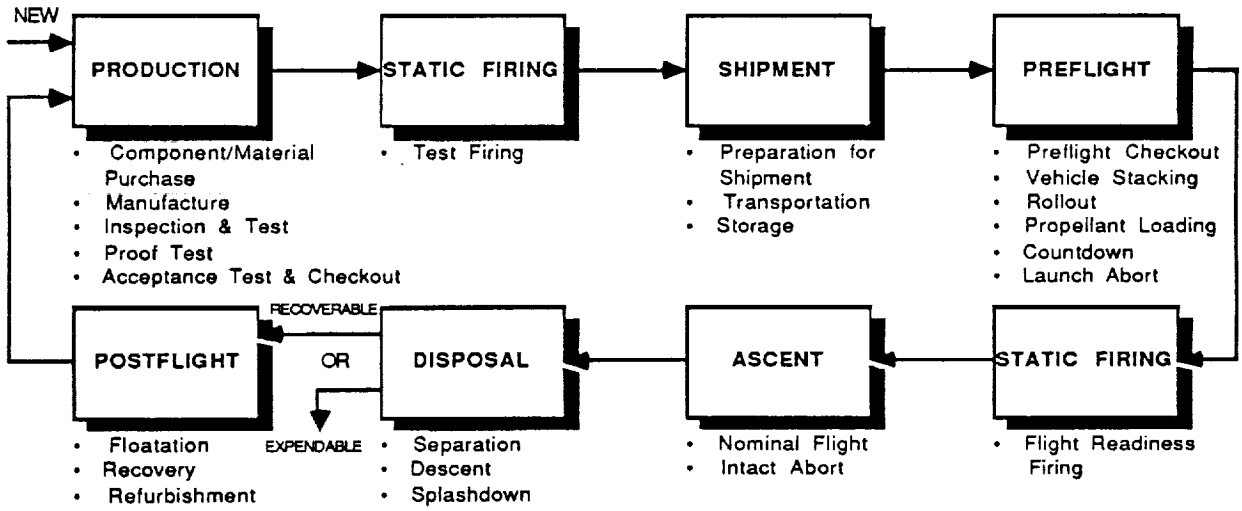
LIQUID ROCKET BOOSTER SUBSYSTEMS & INTERFACES / COMPOSITE HAZARDS		1 HAZARDOUS ENVIRONMENTS	2 WORKER OVERLOAD	3 UNSAFE/UNHYGIENIC WORKING CONDITIONS	4 METEOROIDS & METEORITES	5 WIND	6 CONTAMINATION	7 HEAT SOURCES	8 RADIATION/SUNLIGHT	9 MOISTURE/PRECIPITATION	10 ELECTRICAL SYSTEM MALFUNCTION	11 DIFFERENTIAL PRESSURE	12 VIBRATION, ACOUSTIC LOADS, & SHOCK	13 STRUCTURAL LOADS	14 LEAKS	15 PROPELLANT CHARACTERISTICS & PRODUCTS	16 LIGHTNING/ELECTROMAGNETIC DISCHARGE	17 FAULTY DOCUMENTATION	18 CHEMICAL ACTIVITY	19 COMPUTER SYSTEM MALFUNCTION	20 OPERATOR ERROR	21 WEAR	22 EMERGENCIES
AVIONICS	0	1	2	3	4	5			8	9		11		13	14	15	16	17	18		20		
BOOSTER SEPARATION SYSTEM	22		24	25	26	27	28		30	31		33		35	36	37		39	40			43	
FLIGHT CREW	44	45			48	49	50	51	52	53	54	55		57	58		60	61	62	63		65	
PARACHUTES AND RECOVERY AIDS	66		68		70		72			75		77	78	79	80	81		83	84			87	
ELECTRICAL, BATTERIES & APU	88		90	91	92	93			96					101				105			108		
LAUNCH FACILITIES	110				114	115			118	119												131	
LRB/GROUND INTERFACES	132				136				140	141					146			149				153	
HAZARDOUS GAS DETECTION SYSTEM	154				158	159			162					167						173		175	
LRB/ET INTERFACES	176				180	181			184	185					190	191			194			197	
ET AND COMPONENTS	198		200	201	202	203	204		206	207	208	209		211		213	214	215		217		219	
CRYOGENIC TANKS AND SYSTEMS	220		222		224	225			228					233				237		239	240	241	
LIQUID INJECTION SUBSYSTEM	242		244		246	247			250									259			262	263	
ENGINES AND CONTROLLERS	264	265	266		268	269										279					284		
TVC ACTUATORS AND SUBSYSTEM	286	287	288		290	291										301					306		
ORBITER, SUBSYSTEMS AND PAYLOAD	308	309	310	311	312	313			316	317						323	324		326		328	329	
PROPELLANTS AND PROPULSION	330				334	335			338					343						349		351	
CREW ACCESS PROVISIONS	352				356	357	358	359	360			363	364	365					370			373	
RANGE SAFETY SYSTEM	374		376		378	379	380			383		385		387	388	389		391	392			395	
VEHICLE STRUCTURE & MATERIAL	396	397	398		400	401	402		404	405	406							413		415		417	
THERMAL PROTECTION SUBSYSTEMS	418	419	420		422	423	424				428	429		431				435	436	437	438		
THE ENVIRONMENT/THE PUBLIC	440				444				448					453				457				461	
COMPUTER SYSTEMS & SOFTWARE	462	463	464		466	467	468	469	471			473		475	476	477			480		482	483	
PRESSURIZATION SUBSYSTEM	484	485	486	487	488	489	490	491	492	493				497				501			504	505	
PERSONNEL	506				510	511				515				519	520				524			527	
CONTROLS AND DISPLAYS	528	529			532	533	534	535	536	537		539	540	541	542	543	544		546			549	
CAUTION AND WARNING	550				554		556		558													571	

HAZARD EXCLUSION MATRIX

become a concern, and which subsystems might either create or be at risk. A diagram of the life cycle of the LRB is shown below.

a. The phases of the LRB life cycle investigated for this hazard analysis are:

(1) Component/material purchase, including acquisition of GFP
(2) Manufacture and fabrication of subsystems and components
(3) Inspection and test of the LRB and subsystems
(4) Proof test of pressure vessels and structure
(5) Acceptance test and checkout prior to delivery to the Government
(6) Test firing of engines and/or the completed booster
(7) Flight readiness firing (FRF) of the STS vehicle
(8) Preparation for shipment of the booster and ship loose hardware
(9) Transportation from manufacture to launch site or after recovery
(10) Storage, including storage of major components
(11) Preflight checkout prior to stacking
(12) Vehicle stacking, including ancillary test activities
(13) Rollout from the VAB and preloading preparation
(14) Propellant loading for test or flight
(15) Countdown to liftoff or abort
(16) Launch abort activities, including mission postponement (scrub)
(17) Nominal flight from liftoff to LRB burnout
(18) Intact abort, including RTLS, TAL, AOA, and ATO
(19) Separation of the LRB from the STS vehicle
(20) Descent from separation to ocean impact
(21) Splashdown events occuring at impact (disposable for expendables)
(22) Floatation (of recoverable boosters) until recovery
(23) Recovery activities, including towing, and retrieval of recoverables
(24) Refurbishment of reusable components



LIQUID ROCKET BOOSTER SYSTEM LIFE CYCLE

b. Comparing these life cycle phases with the list of subsystems on page 3 reveals some areas of exclusion which are discussed below and shown graphically by the circles in the matrix on the next page. The numbers in the circles are keyed numerically to the discussion below:

(1) The flight crew is not involved in the LRB life cycle until they are brought aboard, possibly during propellant loading. They are also not involved with the flight of the booster after LRB separation. Therefore the phases before and after these times, respectively, do not pertain to the flight crew.

(2) Similarly, the launch facilities are not involved until preflight checkout, except for FRF, nor after launch. They may, however be involved in refurbishment. Storage areas may or may not be at the launch site, but they are not launch facilities. Therefore the phases before preflight checkout and after launch abort, except for FRF and refurbishment, are excluded from consideration.

(3) Essentially the same rationale pertains to the ET and Orbiter, which are not associated with the LRB until vehicle stacking, and cease to be associated after LRB separation. Life cycle phases before and after this time do not pertain to these systems.

(4) Component and material purchase, acceptance tests and checkout, preparation for shipment and preflight checkout are considered to be benign operations which do not appreciably affect either the environment or the public. Also, LRB separation takes place at such an altitude that there is negligible environmental or public impact. For this reason, these particular phases are excluded.

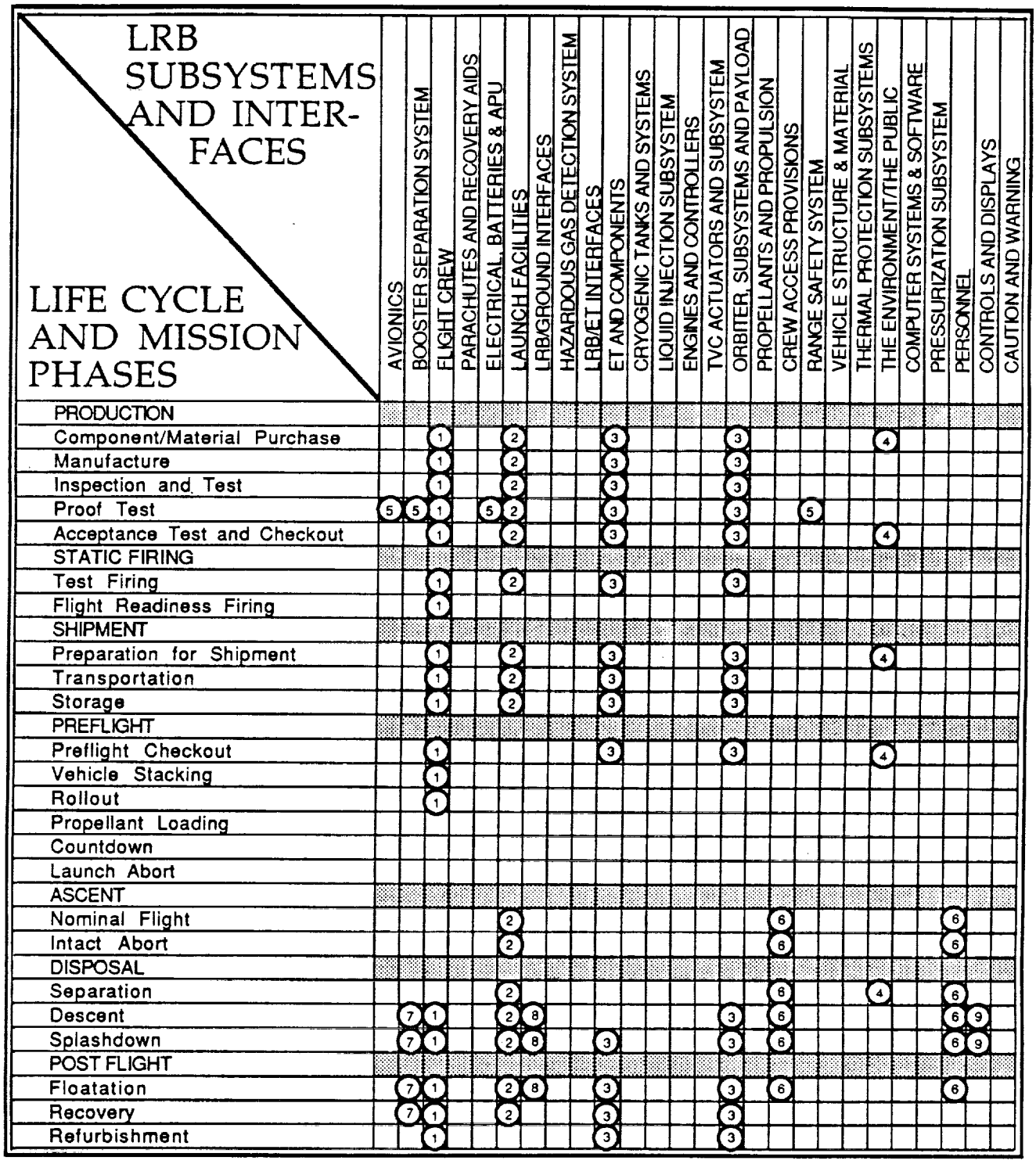
(5) Avionics packages, the booster separation system, electrical systems and the range safety system (RSS) are not considered to be proof tested. Proof test is therefore not considered for these systems.

(6) Mission and launch support personnel do not interface with the LRB after liftoff and before recovery, and no crew access provisions are required during that time. Therefore, these systems are excluded from consideration during ascent, disposal and floatation.

(7) The booster separation system is considered spent after separation and before refurbishment. Therefore this system is not analyzed between these two life cycle phases.

(8) Similar reason pertains to the LRB/ground interfaces, which are not involved during descent, splashdown and floatation. JSC is considered a ground interface during flight, so ground interface considerations do apply during this time.

(9) There do not appear to be any control and display requirements during descent and splashdown, and these considerations are therefore excluded.


LRB SUBSYSTEMS AND INTER-FACES
LIFE CYCLE AND MISSION PHASES
AVIONICS
BOOSTER SEPARATION SYSTEM
FLIGHT CREW
PARACHUTES AND RECOVERY AIDS
ELECTRICAL, BATTERIES & APU
LAUNCH FACILITIES
LRB/GROUND INTERFACES
HAZARDOUS GAS DETECTION SYSTEM
LRB/ET INTERFACES
ET AND COMPONENTS
CRYOGENIC TANKS AND SYSTEMS
LIQUID INJECTION SUBSYSTEM
ENGINES AND CONTROLLERS
TVC ACTUATORS AND SUBSYSTEM
ORBITER, SUBSYSTEMS AND PAYLOAD
PROPELLANTS AND PROPULSION
CREW ACCESS PROVISIONS
RANGE SAFETY SYSTEM
VEHICLE STRUCTURE & MATERIAL
THERMAL PROTECTION SUBSYSTEMS
THE ENVIRONMENT/THE PUBLIC
COMPUTER SYSTEMS & SOFTWARE
PRESSURIZATION SUBSYSTEM
PERSONNEL
CONTROLS AND DISPLAYS
CAUTION AND WARNING
PRODUCTION
Component/Material Purchase
Manufacture
Inspection and Test
Proof Test
Acceptance Test and Checkout
STATIC FIRING
Test Firing
Flight Readiness Firing
SHIPMENT
Preparation for Shipment
Transportation
Storage
PREFLIGHT
Preflight Checkout
Vehicle Stacking
Rollout
Propellant Loading
Countdown
Launch Abort
ASCENT
Nominal Flight
Intact Abort
DISPOSAL
Separation
Descent
Splashdown
POST FLIGHT
Floatation
Recovery
Refurbishment

MATRIX 2

LRB SUBSYSTEMS AND INTER-FACES / LIFE CYCLE AND MISSION PHASES		1 AVIONICS	2 BOOSTER SEPARATION SYSTEM	3 FLIGHT CREW	4 PARACHUTES AND RECOVERY AIDS	5 ELECTRICAL, BATTERIES & APU	6 LAUNCH FACILITIES	7 LRB/GROUND INTERFACES	8 HAZARDOUS GAS DETECTION SYSTEM	9 LRB/ET INTERFACES	10 ET AND COMPONENTS	11 CRYOGENIC TANKS AND SYSTEMS	12 LIQUID INJECTION SUBSYSTEM	13 ENGINES AND CONTROLLERS	14 TVC ACTUATORS AND SUBSYSTEM	15 ORBITER, SUBSYSTEMS AND PAYLOAD	16 PROPELLANTS AND PROPULSION	17 CREW ACCESS PROVISIONS	18 RANGE SAFETY SYSTEM	19 VEHICLE STRUCTURE & MATERIAL	20 THERMAL PROTECTION SUBSYSTEMS	21 THE ENVIRONMENT/THE PUBLIC	22 COMPUTER SYSTEMS & SOFTWARE	23 PRESSURIZATION SUBSYSTEM	24 PERSONNEL	25 CONTROLS AND DISPLAYS	26 CAUTION AND WARNING
PRODUCTION																											
Component/Material Purchase	572			575			578				582					587						593					
Manufacture	598			601			604				608					613											
Inspection and Test	624			627			630				634					639											
Proof Test	650	651	652	653		655	656				660					665			668								
Acceptance Test and Checkout	676			679			682				686					691						697					
STATIC FIRING																											
Test Firing	702			705			708				712					717											
Flight Readiness Firing	728			731																							
SHIPMENT																											
Preparation for Shipment	754			757			760				764					769						775					
Transportation	780			783			786				790					795											
Storage	806			809			812				816					821											
PREFLIGHT																											
Preflight Checkout	832			835							842					847						853					
Vehicle Stacking	858			861																							
Rollout	884			887																							
Propellant Loading	910																										
Countdown	936																										
Launch Abort	962																										
ASCENT																											
Nominal Flight	988						994											1005							1012		
Intact Abort	1014						1020											1031							1038		
DISPOSAL																											
Separation	1040						1046											1057				1061			1064		
Descent	1066		1068	1069			1072	1073								1081		1083							1090	1091	
Splashdown	1092		1094	1095			1098	1099			1102					1107		1109							1116	1117	
POST FLIGHT																											
Floatation	1118		1120	1121			1124	1125			1128					1133		1135							1142		
Recovery	1144		1146	1147			1150				1154					1159											
Refurbishment	1170			1173							1180					1185											

HAZARD EXCLUSION MATRIX

c. The final life cycle/system matrix is shown on page 46. The intersections in the matrix which are to be excluded are numbered to allow them to be identified as combinations not to be considered by the computer. The remaining intersections, which constitute most of the matrix, are to be considered as indicated by the X marks in each block.

d. Having determined the life cycle phases to be examined for each system or subsystem within the LRB, the next step is to consider which composite hazards apply to each life cycle phase. This is done in a manner similar to that used in the consideration of systems and subsystems. The exclusion method is used once again to identify those combinations of life cycle and composite hazards which either do not apply to the current configuration, or those for which the concept is not sufficiently mature to make a reasonable determination of the risk. The exclusions are identified in the matrix on the next page. Once again, the numbers in the circles are keyed to the discussion which follows:

(1) None of the composite hazards, with the possible exception of faulty specifications in the purchase order documentation, appears to pertain to component or material purchase. For this reason, all of the hazards except faulty documentation are excluded from this phase.

(2) Meteorites are no more a hazard at the altitudes at which the LRB will be flying than they are on the ground. They are therefore not further considered. It should be noted that meteorites are also excluded from the hazard matrix on page 35 for the same reason.

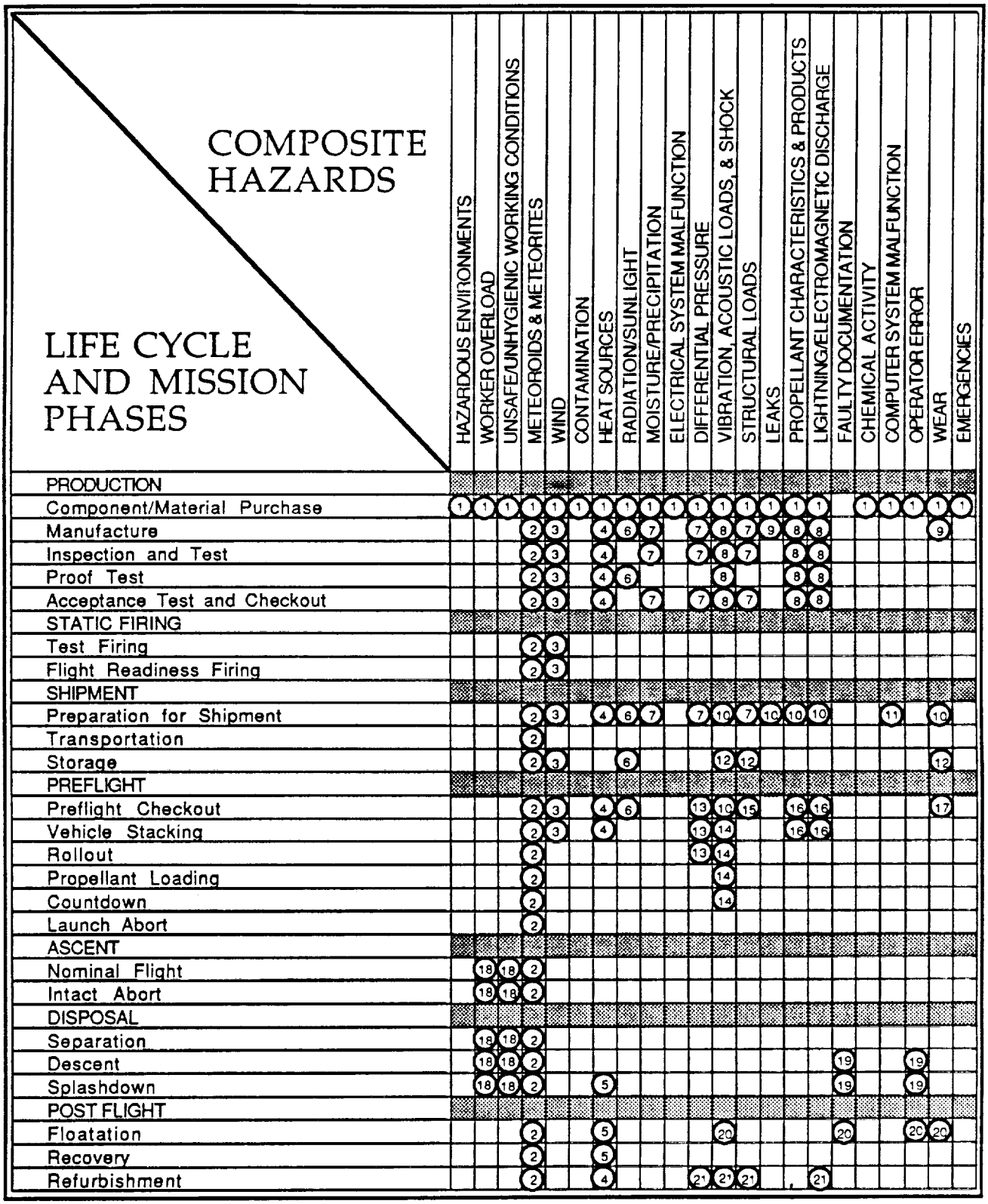
(3) With the exception of transportation, all pre-rollout activities associated with the LRB will be in environments in which the effects of wind are either excluded or controlled. Wind is therefore excluded from consideration before rollout, except for transporation, where it may be a problem.

(4) For the same reason, heat sources are expected to be controlled during production, preparation for shipment, preflight checkout, vehicle stacking, and refurbishment activities, and so are excluded from further consideration.

(5) Heat sources are also expected to be relatively benign during splash-down, floatation and recovery. Therefore this hazard is excluded during these times.

(6) The activities of manufacturing, proof testing, preparation for shipment and storage are not expected to be performed outdoors, and sunlight is not anticipated to be a problem. These are activities in which ionizing radiation and electromagmetic radiation are not anticipated to be problems either.

(7) Moisture, differential pressure and adverse structural loads are not expected to be problems during manufacture, inspection, test and checkout and so are excluded from further consideration during these activities.


COMPOSITE HAZARDS
LIFE CYCLE AND MISSION PHASES
HAZARDOUS ENVIRONMENTS
WORKER OVERLOAD
UNSAFE/UNHYGIENIC WORKING CONDITIONS
METEOROIDS & METEORITES
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LIGHTNING/ELECTROMAGNETIC DISCHARGE
FAULTY DOCUMENTATION
CHEMICAL ACTIVITY
COMPUTER SYSTEM MALFUNCTION
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WEAR
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PRODUCTION
Component/Material Purchase
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Proof Test
Acceptance Test and Checkout
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Flight Readiness Firing
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Vehicle Stacking
Rollout
Propellant Loading
Countdown
Launch Abort
ASCENT
Nominal Flight
Intact Abort
DISPOSAL
Separation
Descent
Splashdown
POST FLIGHT
Floatation
Recovery
Refurbishment

(8) Since all production operations will take place indoors where lightning and exposure to propellants are not problems, these hazards are excluded from further consideration.

(9) Leaks and wear are considered to be facilities problems during the manufacturing activity, and are not anticipated to be a problem in a properly operated facility. For this reason, these hazards are also excluded from further consideration.

(10) Preparation for shipment is expected to be a relatively benign phase in which damaging acoustic loads, leaks, propellant characteristics, lightning or wear are not considered to be issues of major concern. These are therefore excluded.

(11) It is not obvious how a computer malfunction could jeopardize any subsystem of the LRB during preparation for shipment. Computerized test equipment may jeopardize the LRB if there is a malfunction, but this hazard pertains to test and checkout activity, where it is considered. This hazard is therefore excluded from further consideration during preparation for shipment.

(12) The LRB is not expected to be stored where it could be subjected to damaging vibration, structural loads or wear, and this combination is therefore not further considered.

(13) During preflight checkout, vehicle stacking and rollout, pressure to the LRB will be carefully controlled and monitored. Differential pressure is not considered to be a hazard during this time.

(14) During all preflight activities except launch abort after SSME start, acoustic loading is expected to be benign, and is therefore not further considered.

(15) The LRB is also not expected to be subjected to major structural loads during preflight checkout.

(16) During preflight checkout and vehicle stacking, the LRB vehicle is not expected to be subjected to the hazards of propellants or lightning, and these hazards are excluded from further consideration at this time.

(17) Wear is not expected to be a hazard during preflight checkout, and so is excluded.

(18) Between liftoff and recovery, the LRB is considered not to have an interface with the launch support crew, and so is neither jeopardized by nor creates worker overload nor unsafe working conditions. During flight, these hazards do not apply.

(19) Likewise, faulty documentation and operator error do not appear to be concerns during descent and splashdown, when the LRB is not controlled.

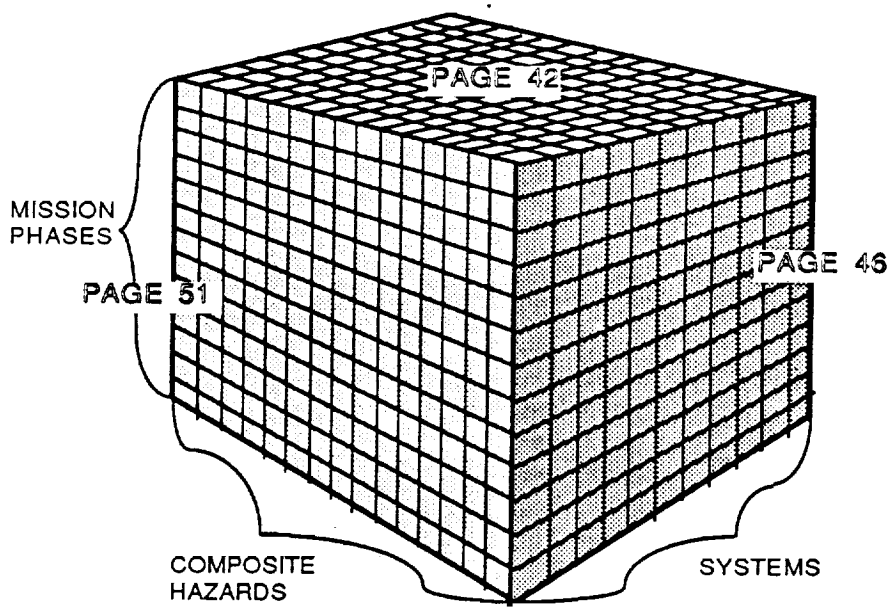
(20) The hazards of vibration, faulty documentation, operator error, and wear do not appear to be credible during floatation prior to recovery of the LRBs, and are excluded for this reason.

(21) Due to the anticipated controlled environment during refurbishment, differential pressure, vibration, structural loads and lightning do not appear to be credible hazards at this time.

e. As in the other two matrices, the combinations excluded are numbered to allow the computer to identify and disregard them. The remaining items are to be considered and are indicated by an X in the matrix on page 51.

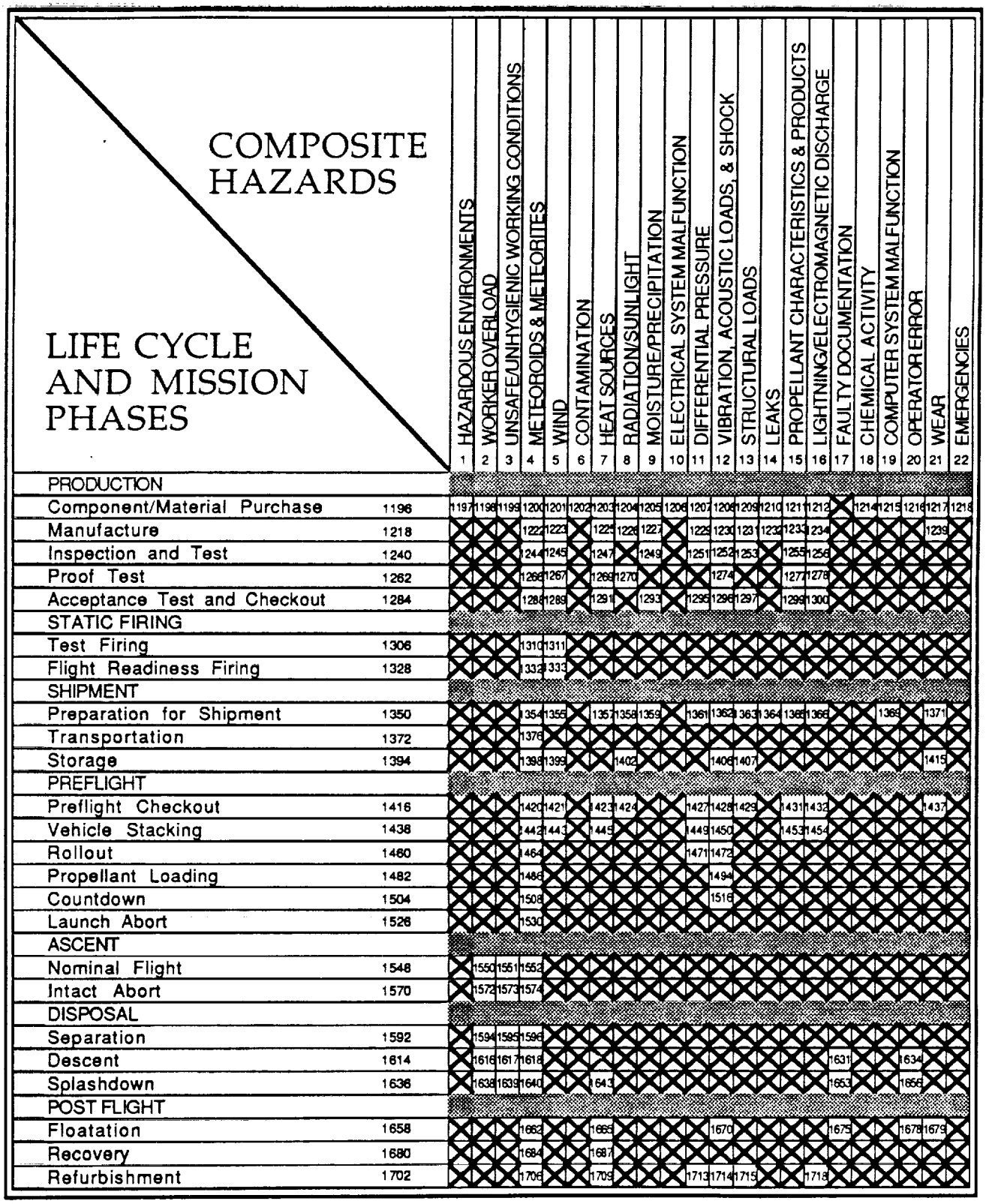
21. METHOD OF COMPUTERIZED ANALYSIS - Although hazard analysis is not yet an activity which can be accomplished by an algorithm, a computer can be used as a tool to perform housekeeping tasks, such as keeping track of which systems, hazards and life cycle phases have been analyzed. This frees the analyst to concentrate on the analytical tasks involved. The main usefulness of the computer is to insure that the analyst has considered all of these elements which have been identified as being of concern. The computer program used is called "PHAROS."

a. The combination of composite hazards, systems and life cycle phases can be considered the axes of a three-dimensional matrix. Physically, this matrix can be visualized as a cube, the three orthogonal faces of which can be represented by the two-dimensional matrices on pages 42, 46 and 51, as shown below. This cube is divided into subcubes, each of which represents a unique combination consisting of one composite hazard, one system or subsystem, and one life cycle phase.



THREE DIMENSIONAL MATRIX

MATRIX 3



HAZARD EXCLUSION MATRIX

b. Program PHAROS, written in Microsoft™ BASIC, is shown on pages 55 through 64. The utility of PHAROS lies in the ability of the program to keep track of each of of the 3-dimensional matrix combinations, display a hazard title discriptive of each one of them, and prompt the analyst to consider each one. This *guarantees* that no combination of composite hazard, LRB system, and life cycle phase, except those specifically excluded, as previously discussed, will be overlooked.

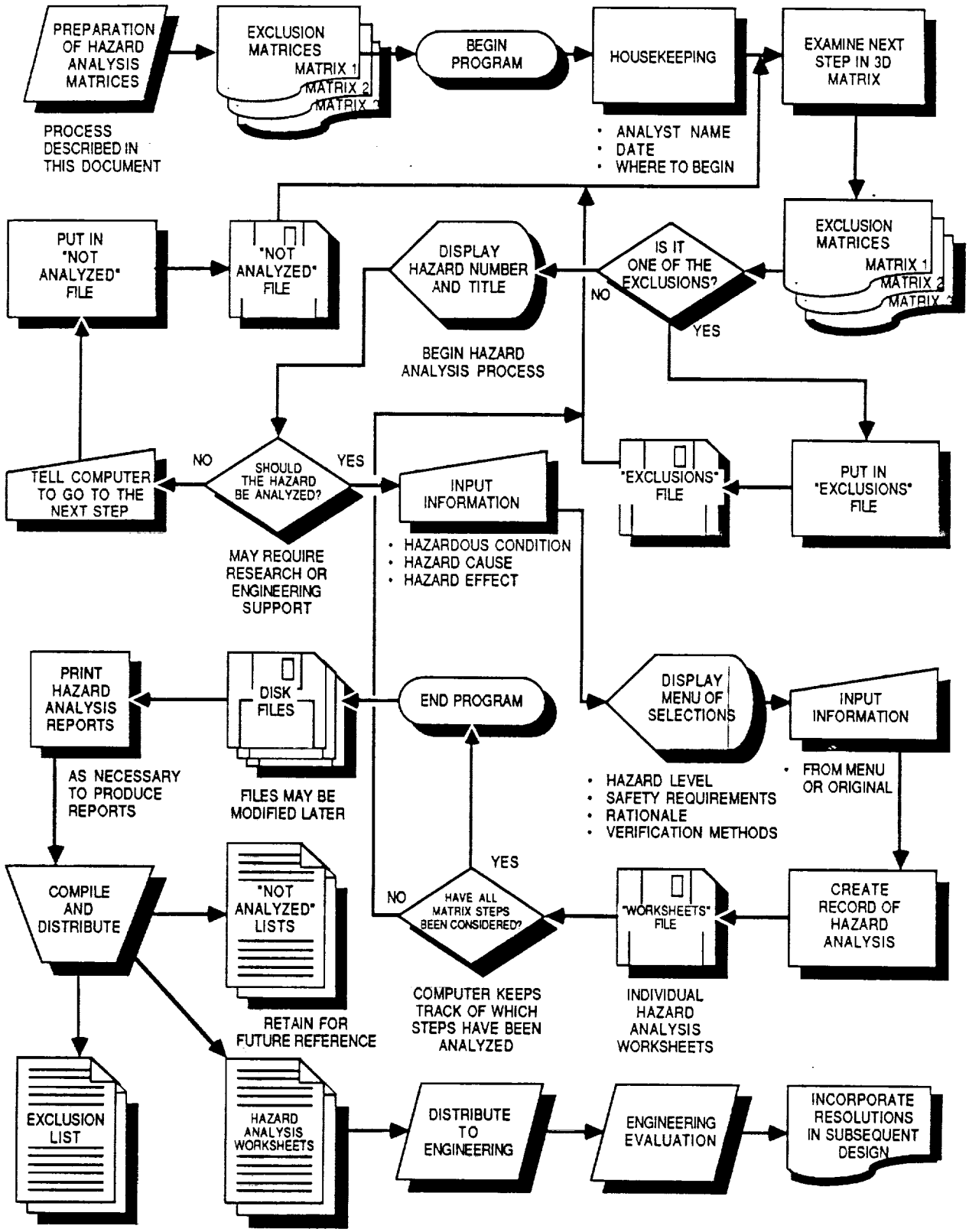
c. A diagram of the operation of PHAROS is shown on page 53. Preparation of hazard analysis matrices has been described in this document, and the resulting exclusion matrices are shown on pages 42, 46 and 51. The data base from which PHAROS works is located at the beginning of the program, and consists of the lists of life cycle phases, systems and composite hazards previously identified. The numbers in the matrices are also included as exclusion list entries to tell PHAROS to ignore them. Without this important preliminary work, PHAROS would request analysis of all 13,728 combinations - a staggering number of hazard analyses!

d. PHAROS begins by performing "housekeeping" activities, such as asking for the analyst's name, the current date, and where the program is to begin in the three-dimensional matrix. (It is envisioned that several sessions with the computer will be required to get through the entire matrix.) When the starting point has been determined, the computer examines each element or step in sequence and checks automatically to see if it is on one of the exclusion matrices. If so, it notes the fact in a disk file of excluded combinations and goes on to the next step in the matrix.

e. If the hazard is not on any of the exclusion matrices, PHAROS displays the hazard number and title. At this point, hazard numbers are determined by the location of the step in the three-dimensional matrix. (The hazard number begins with the catagory identifier letter listed on pages 3, followed by a number which is 504 plus 24 times the number of the hazard listed in paragraph 11 a, plus the number of the life cycle phase listed in paragraph 20 a on page 43. This results in the first hazard for each catagory or system being # 529.) PHAROS also prepares a title from the lists in the data base in the program. This initiates the analysis process.

f. At this point, the analyst decides if the hazard should be analyzed, based on the current concept. This decision may require research or engineering support to see if the hazard is worth investigating. If the analyst decides that the hazard described does not require detailed analysis, he inputs a keystroke which informs the computer to go to the next step. Analyst comments can also be entered. PHAROS complies by putting the hazard title and comments, if any, into a "not analyzed" file. The purpose of this file is to provide historical proof that a conscious decision was made not to further investigate the hazard, and to provide a file from which proposed hazards can be reexamined at a later stage of concept or design maturity. After updating the file, PHAROS goes to the next step in the three-dimensional matrix.

g. If the analyst decides that the hazard should be analyzed, another keystroke will command PHAROS to prepare a hazard analysis worksheet and prompt for additional information, such as hazardous condition and hazard cause



"PHAROS" COMPUTERIZED HAZARD ANALYSIS FLOWCHART

and effect, which is then entered from the keyboard. PHAROS also displays a menu of common selections, which can be selected with a single keystroke instead of typing them. The analyst may use the menu or compose his own comments on the keyboard. In either case, the comment is entered on a hazard analysis worksheet stored as an entry in the "Worksheets" disk file.

h. At this point, the hazard analysis number is changed so that each hazard analysis worksheet will be numbered sequentially beginning with 001 for each system catagory. The old hazard number is shown in parenthesis. Since there cannot be more than (22 x 24), or 528 hazard analyses in any one system catagory, the new hazard analysis numbers and the ones originally assigned cannot overlap.

i. PHAROS will go through the matrix one step at a time until told to quit or until all steps have been considered. At this point, there will be three disk files, one of hazards not analyzed (# 529 and above for each system catagory), another of hazard analysis worksheets (# 001 to 528 or less), and one of hazard combinations excluded because they were identified previously in the exclusion matrices. These files can be read out from the disk files at any time. Hazard analysis worksheets will automatically be formatted by PHAROS. The data on each worksheet will be in the format described in paragraph 7. The hazard analysis worksheets can be updated by reading from the disk files and adding information at any time. Saving the files in this way provides an easy method of keeping track of each analysis, and updating it at a later time without having to type it over again.

j. The next step is the second most important one in the entire PHA activity. The hazard analysis worksheets are collated and distributed to the engineering design group for consideration. Having a separate worksheet for each hazard analysis allows them to be distributed to the various design disciplines or individual design engineers to which they pertain. It is anticipated that, In many cases, further engineering review will indicate that the hazard requires additional analysis, research, or discussion. The hazard analysis worksheet serves as the documented record of this activity. The record can be updated in the disk file as time permits.

k. The most important step, of course, is the incorporation of the engineering resolution to each hazard in subsequent design activity. The entire PHA process therefore becomes one of documenting which hazards will *not* occur in the final design, or which will be reduced to the lowest level of risk possible. This is the purpose of the PHA, to identify hazards *before* the design so they can be eliminated as the design progresses. When the LRB is developed, each of the hazards which the PHA identified will be identified, addressed, and resolved by engineering effort. The PHA therefore is a record of the degree of safety which was purchased with the money spent on its preparation.

22. EXTENT OF THE PHA EFFORT - A three dimensional matrix consisting of 22 x 24 x 26 entries contains 13,728 separate intersections. Each entry is either excluded because it is on an exclusion matrix, analyzed on a hazard analysis worksheet, or put on the "not analyzed" list. PHAROS will consider them all.

```
'*****************************************************************************
'***     THIS IS PROGRAM "PHAROS" WRITTEN BY JOHN H. LINDORFER,          ***
'***     MARTIN MARIETTA MANNED SPACE SYSTEMS, NEW ORLEANS,              ***
'***     LOUISIANA 70189, MARCH 10, 1988.  COPYRIGHT 1988 BY             ***
'***     MARTIN MARIETTA CORPORATION.  ALL RIGHTS RESERVED.              ***
'*****************************************************************************
'** THIS DATA MUST BE CHANGED FOR EACH MAJOR SYSTEM ANALYZED ***
'THE FOLLOWING ARE THE SYSTEMS OR SUBSYSTEMS FROM PAGE 3.

NOSYS = 26' THIS IS HOW MANY OF THEM THERE ARE
DATA LRB avionics, The booster separation system
DATA The flight crew, Parachutes and recovery aids
DATA "The electrical system, batteries or APU", Launch facilities
DATA LRB/Ground interfaces, The LRB hazardous gas detection system
DATA LRB/ET interfaces, The ET and components, Cryogenic tanks and systems
DATA The liquid injection system (if used), Engines and/or controllers
DATA TVC actuators and subsystem, "The Orbiter, subsystems and payload"
DATA Propellants and/or propulsion systems, Crew access provisions
DATA The range safety system, Vehicle structure and material
DATA Thermal protection subsystems, The environment or the public
DATA Computer systems or software, The pressurization subsystem
DATA Personnel, Controls and displays, Caution and warning systems

'THESE ARE THE COMPOSITE HAZARDS FROM PAGES 14 & 15.

NOHAZ = 22' THIS IS HOW MANY OF THEM THERE ARE
DATA hazardous environments, worker overload
DATA unsafe or unhygienic working conditions
DATA meteoroids and meteorites, wind, contamination, heat sources
DATA radiation or sunlight, moisture or precipitation, electrical system malfunction
DATA differential pressure, "vibration, acoustic loads or shock", structural loads
DATA leaks, propellant characteristics and products
DATA lightning or electromagnetic discharge, faulty documentation
DATA chemical activity, computer system malfunction, operator error, wear
DATA emergencies

'THESE ARE THE LIFE CYCLE PHASES FROM PAGE 43.

NOLIF = 24' THIS IS HOW MANY OF THEM THERE ARE
DATA "component or material purchase, including acquisition of GFP"
DATA manufacture and fabrication of subsystems and components
DATA inspection and test of the LRB and subsystems
DATA proof test of pressure vessels and structure
DATA acceptance test and checkout prior to delivery to the Government
DATA test firing of engines and/or the completed booster
DATA flight readiness firing (FRF) of the STS vehicle
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DATA preparation for shipment of the booster and ship loose hardware
DATA transportation from manufacture to launch site or after recovery
DATA "storage, including storage of major components"
DATA preflight checkout prior to stacking
DATA "vehicle stacking, including ancillary test activities"
DATA rollout from the VAB and preloading preparation
DATA propellant loading for test or flight, countdown to liftoff or abort
DATA "launch abort activities, including mission postponement (scrub)"
DATA nominal flight from liftoff to LRB burnout
DATA "intact abort, including RTLS, TAL, AOA and ATO"
DATA separation of the LRB from the STS vehicle
DATA descent from separation to ocean impact
DATA splashdown events occuring at impact (disposable for expendables)
DATA floatation (of recoverable boosters) until recovery
DATA "recovery activities, including towing, and retrieval of recoverables"
DATA refurbishment of reusable components

'THESE ARE THE EXCLUSIONS LISTED ON PAGE 42 OF THE TEXT (MATRIX 1).

HAZSYS = 254' THIS IS HOW MANY OF THEM THERE ARE IN THIS TABLE
DATA 001, 002, 003, 004, 005, 008, 009, 011, 013, 014, 015, 016, 017, 018, 020
DATA 024, 025, 026, 027, 028, 030, 031, 033, 035, 036, 037, 039, 040, 043, 045
DATA 048, 049, 050, 051, 052, 053, 054, 055, 057, 058, 060, 061, 062, 063, 065
DATA 068, 070, 072, 075, 077, 078, 079, 080, 081, 083, 084, 087, 090, 091, 092
DATA 093, 096, 101, 105, 108, 114, 115, 118, 119, 131, 136, 140, 141, 146, 149
DATA 153, 158, 159, 162, 167, 173, 175, 180, 181, 184, 185, 190, 191, 194, 197
DATA 200, 201, 202, 203, 204, 206, 207, 208, 209, 211, 213, 214, 215, 217, 219
DATA 222, 224, 225, 228, 233, 237, 239, 240, 241, 244, 246, 247, 250, 259, 262
DATA 263, 265, 266, 268, 269, 279, 284, 287, 288, 290, 291, 301, 306, 309, 310
DATA 311, 312, 313, 316, 317, 323, 324, 326, 328, 329, 334, 335, 338, 343, 349
DATA 351, 356, 357, 358, 359, 360, 363, 364, 365, 370, 373, 376, 378, 379, 380
DATA 383, 385, 387, 388, 389, 391, 392, 395, 397, 398, 400, 401, 402, 404, 405
DATA 406, 413, 415, 417, 419, 420, 422, 423, 424, 428, 429, 431, 435, 436, 437
DATA 438, 444, 448, 453, 457, 461, 463, 464, 466, 467, 468, 469, 471, 473, 475
DATA 476, 477, 480, 482, 483, 485, 486, 487, 488, 489, 490, 491, 492, 493, 497
DATA 501, 504, 505, 510, 511, 515, 519, 520, 524, 527, 529, 532, 533, 534, 535
DATA 536, 537, 539, 540, 541, 542, 543, 544, 546, 549, 554, 556, 558, 571

'THESE ARE THE EXCLUSIONS LISTED ON PAGE 46 OF THE TEXT (MATRIX 2).

SYSLIF = 93' THIS IS HOW MANY OF THEM THERE ARE IN THIS TABLE
DATA 0575, 0578, 0582, 0587, 0593, 0601, 0604, 0608, 0613, 0627, 0630, 0634
DATA 0639, 0651, 0652, 0653, 0655, 0656, 0660, 0665, 0668, 0679, 0682, 0686
DATA 0691, 0697, 0705, 0708, 0712, 0717, 0731, 0757, 0760, 0764, 0769, 0775
DATA 0783, 0786, 0790, 0795, 0809, 0812, 0816, 0821, 0835, 0842, 0847, 0853
DATA 0861, 0887, 0994, 1005, 1012, 1020, 1031, 1038, 1046, 1057, 1061, 1064
```

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DATA 1068, 1069, 1072, 1073, 1081, 1083, 1090, 1091, 1094, 1095, 1098, 1099
DATA 1102, 1107, 1109, 1116, 1117, 1120, 1121, 1124, 1125, 1128, 1133, 1135
DATA 1142, 1146, 1147, 1150, 1154, 1159, 1173, 1180, 1185

'THESE ARE THE EXCLUSIONS LISTED ON PAGE 51 OF THE TEXT (MATRIX 3).

HAZLIF = 141' THIS IS HOW MANY OF THEM THERE ARE IN THIS TABLE
DATA 1197, 1198, 1199, 1200, 1201, 1202, 1203, 1204, 1205, 1206, 1207, 1208
DATA 1209, 1210, 1211, 1212, 1214, 1215, 1216, 1217, 1218, 1222, 1223, 1225
DATA 1226, 1227, 1229, 1230, 1231, 1232, 1233, 1234, 1239, 1244, 1245, 1247
DATA 1249, 1251, 1252, 1253, 1255, 1256, 1266, 1267, 1269, 1270, 1274, 1277
DATA 1278, 1288, 1289, 1291, 1293, 1295, 1296, 1297, 1299, 1300, 1310, 1311
DATA 1332, 1333, 1354, 1355, 1357, 1358, 1359, 1361, 1362, 1363, 1364, 1365
DATA 1366, 1369, 1371, 1376, 1398, 1399, 1402, 1406, 1407, 1415, 1420, 1421
DATA 1423, 1424, 1427, 1428, 1429, 1431, 1432, 1437, 1442, 1443, 1445, 1449
DATA 1450, 1453, 1454, 1464, 1471, 1472, 1486, 1494, 1508, 1516, 1530, 1550
DATA 1551, 1552, 1572, 1573, 1574, 1594, 1595, 1596, 1616, 1617, 1618, 1631
DATA 1634, 1638, 1639, 1640, 1643, 1653, 1656, 1662, 1665, 1670, 1675, 1678
DATA 1679, 1684, 1687, 1706, 1709, 1713, 1714, 1715, 1718

'THESE ARE SYSTEM TITLES FOR THE HAZARD ANALYSIS WORKSHEETS

DATA A - Avionics, B - Booster Separation System, C - Flight Crew
DATA D - Parachutes and Recovery Aids, "E - Electrical, Batteries and APU"
DATA F - Launch Facilities, G - LRB/Ground Interfaces
DATA H - Hazardous Gas Detection System, I - LRB/ET Interfaces
DATA J - ET and Components, K - Cryogenic Tanks and Systems
DATA L - Liquid Injection System, M - Engines and Controllers
DATA N - TVC Actuators and Subsystem, "O - Orbiter, Subsystems and Payload
DATA P - Propellants and Propulsion, Q - Crew Access Provisions
DATA R - Range Safety System, S - Vehicle Structure and Material
DATA T - Thermal Protection Subsystems, U - The Environment or The Public
DATA V - Computer Systems and Software, W - Pressurization Subsystem
DATA X - Personnel, Y - Controls and Displays, Z - Caution and Warning Systems
PREFIX$ = "LRB-P-" 'THIS IS THE PREFIX FOR THE LRB PHA NUMBERS

COMMENT1$ = "This hazard is not credible."
COMMENT2$ = "At the current state of maturity, this hazard cannot be evaluated."
COMMENT3$ = "Eliminated by design"
COMMENT4$ = "Minimized by design"
COMMENT5$ = "Provides appropriate safety devices"
COMMENT6$ = "Provides appropriate warning devices"
COMMENT7$ = "Institutes effective special procedures"
COMMENT8$ = "Provides appropriate personal protective equipment"
COMMENT9$ = "Manufacturing process plans"
COMMENT10$ = "Engineering analysis"
```

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COMMENT11$ = "Proof test"
COMMENT12$ = "Functional test"
COMMENT13$ = "Mandatory inspection points"
COMMENT14$ = "Receiving inspection"
COMMENT15$ = "Operation and maintenance instructions"
COMMENT16$ = "STS Flight rules"
COMMENT17$ = "Emergency plans and rehearsals"
COMMENT18$ = "Certificates of training"
COMMENT19$ = "Equipment issue records"
EFFECT1$ = "Loss of mission"
EFFECT2$ = "Loss of STS vehicle"
EFFECT3$ = "Loss of crew"
EFFECT4$ = "Launch crew injury or death"
EFFECT5$ = "Damage to facilities"
EFFECT6$ = "Public emergency"
EFFECT7$ = "Environmental pollution"
EFFECT8$ = "Mission abort or scrub"
EFFECT9$ = "Damage to flight hardware"

'********** THE GENERIC MAIN PROGRAM, "PHAROS," BEGINS HERE **********

'HOUSEKEEPING

MAIN: BEEP: X$ = CHR$(13) + CHR$(0)' X$ IS LINE FEED CHARACTER
INPUT "ENTER ANALYST NAME", ANALYST$
INPUT "ENTER DATE (MM,DD,YY)", DM%, DD%,DY%
WHERE:PRINT "AT WHICH HAZARD DO YOU WISH TO START  (SYSTEM, NUMBER)";
INPUT SYSLET$, OLDHAZNO% ' TELL THE PROGRAM WHERE TO START
SYSNO = ASC(SYSLET$) - 64 ' DETERMINE THE SYSTEM NUMBER
IF SYSNO < 1 THEN GOTO WHERE ' IF TOO SMALL, ASK AGAIN
IF SYSNO > NOSYS THEN GOTO WHERE ' IF TOO LARGE, ASK AGAIN
IF OLDHAZNO% < NOHAZ * NOLIF + 1 THEN GOTO WHERE 'TOO SMALL?; AGAIN
IF OLDHAZNO% > 2*NOHAZ*NOLIF+1 THEN GOTO WHERE 'TOO LARGE?;  AGAIN
HAZNO = INT((OLDHAZNO%-NOHAZ*NOLIF+NOLIF)/NOLIF) ' GET HAZARD #
LIFNO = OLDHAZNO% - (NOLIF*HAZNO) - NOHAZ*NOLIF+NOLIF ' GET LIFE CYCLE #
PRINT "WHAT IS THE LATEST HAZARD NUMBER FOR THIS SYSTEM";
INPUT; NEWHAZNO%: PRINT ' TELL THE SYSTEM THE LATEST HAZARD NUMBER
IF NEWHAZNO% < 0 THEN GOTO MAIN ' IF NEGATIVE, ASK AGAIN
IF NEWHAZNO% > NOHAZ*NOLIF THEN GOTO MAIN 'TOO LARGE?; ASK AGAIN
EXCLU1 = (SYSNO-1) * NOHAZ + HAZNO -1' THIS IS THE LATEST # ON MATRIX 1
EXCLU2 = NOSYS * NOHAZ' THIS IS THE NUMBER OF ITEMS ON MATRIX 1
EXCLU3 = (NOHAZ+NOLIF) * NOSYS' NUMBER OF ITEMS ON MATRICES 1 AND 2
EXCLU4 = SYSNO -1' START WITH THE LAST COLUMN # ON MATRIX 2
EXCLU5 = HAZNO -1' START WITH THE LAST COLUMN # ON MATRIX 3

'EXAMINE NEXT STEP IN 3D MATRIX
```

```
FOR SYSCTR = 1 TO NOSYS' PICK EACH SYSTEM IN TURN
IF SYSNO > SYSCTR THEN GOTO LAST' START WITH SELECTED SYSTEM
FOR HAZCTR = 1 TO NOHAZ ' PICK EACH HAZARD IN TURN
IF SYSCTR <> SYSNO THEN GOTO GOON9' NEXT STEP ONLY IF THIS IS SYSNO
IF HAZNO > HAZCTR THEN GOTO PENULT' DROP OUT IF HAZNO > HAZCTR
GOON9: FOR LIFCTR = 1 TO NOLIF ' PICK EACH LIFE CYCLE IN TURN
'IF THE SELECTED HAZARD HAS NOT BEEN REACHED, CONTINUE LOOPING
MTEST = (SYSCTR-1)*NOLIF*NOHAZ+(HAZCTR-1)*NOLIF+LIFCTR' START # YET?
IF MTEST<(SYSNO-1)*NOLIF*NOHAZ+(HAZNO-1)*NOLIF+LIFNO THEN GOTO FINAL

'READ EXCLUSION MATRICES

    FOR COUNTER = 1 TO SYSCTR
    READ SYSTITLE$ ' READ SYSTEM DESCRIPTION
    NEXT COUNTER ' GO THROUGH SYSTEM LIST
    FOR COUNTER = SYSCTR + 1 TO HAZCTR + NOSYS
    READ HAZTITLE$ ' READ THE HAZARD
    NEXT COUNTER ' GO THROUGH HAZARD LIST
    FOR COUNTER = HAZCTR + NOSYS + 1 TO LIFCTR + NOSYS + NOHAZ
    READ LIFTITLE$ ' READ LIFE CYCLE PHASE
    NEXT COUNTER ' GO THROUGH LIFE CYCLE LIST
    FOR COUNTER = LIFCTR + NOSYS + NOHAZ + 1 TO NOSYS + NOHAZ + NOLIF
    READ NOTHING$ ' GO TO END OF LIST OF TITLES
    NEXT COUNTER ' FINISH COUNTING

'CHECK EXCLUSION LIST

OPEN "EXCLUSIONS" FOR APPEND AS #1: WIDTH #1, 255' OPEN EXCLUSION FILE
    Z% = 0' SET UP DUMMY TO NOTE ITEMS ON EXCLUSION LIST
    FOR COUNTER = 1 TO HAZSYS: READ EXCLUNO' READ NOS FROM MATRIX 1

'IS IT ONE OF THE EXCLUSIONS?

    IF (SYSCTR-1) * NOHAZ + HAZCTR <> EXCLUNO THEN GOTO GOON1
    IF EXCLU1 => EXCLUNO THEN Z% = 1: GOTO GOON1' LIST ONLY ONCE
    IF LIFCTR > 1 THEN Z% = 1: GOTO GOON1' LIST ONCE ONLY
    EXCLU1 = EXCLUNO' KEEP TRACK OF WHAT HAS BEEN PUT ON LIST

'PUT IN EXCLUSION FILE

    PRINT #1, SYSTITLE$; " can cause or be jeopardized by "; HAZTITLE$;
    PRINT #1," (Number"; EXCLUNO; "on MATRIX 1) ("; DM%; DD%; DY%; ")."
    PRINT #1,: Z% = 1' NOTE THAT THIS ITEM IS ON EXCLUSION MATRIX 1
    GOON1: NEXT COUNTER ' FINISH READING THE LIST ON MATRIX 1
    FOR COUNTER = 1 TO SYSLIF: READ EXCLUNO ' READ FROM MATRIX 2
    IF (LIFCTR+NOHAZ-1) * NOSYS + SYSCTR <> EXCLUNO THEN GOTO GOON2
```

```
        IF HAZCTR > 1 THEN Z% = Z% + 2: GOTO GOON2' IT WAS PUT ON HAZARD #1
        IF (EXCLU2+EXCLU4) => EXCLUNO THEN Z% = Z%+2: GOTO GOON2
        EXCLU4 = EXCLUNO - EXCLU2' KEEP TRACK OF WHAT IS ON LIST
        PRINT #1, SYSTITLE$; " can cause hazards or be jeopardized during "; LIFTITLE$;
        PRINT #1, " (Number"; EXCLUNO; "on MATRIX 2) ("; DM%; DD%; DY%; ")."
        PRINT #1,: Z% = Z% + 2' NOTE THAT THIS ITEM IS ON EXCLUSION MATRIX 2
        GOON2: NEXT COUNTER ' FINISH READING THE LIST ON MATRIX 2
        FOR COUNTER = 1 TO HAZLIF: READ EXCLUNO ' READ MATRIX 3
        Y%=(NOHAZ+NOLIF)*NOSYS+(LIFCTR-1)*NOHAZ+HAZCTR' (Y% IS DUMMY)
        IF Y% > EXCLUNO THEN GOTO GOON3' BECAUSE IT'S NOT BEEN FOUND
        IF Y% < EXCLUNO THEN GOTO GOODBY' BECAUSE IT'S NOT ON LIST
        IF SYSCTR > 1 THEN Z% = Z%+4: GOTO GOODBY'  IT'S ON MATRIX 3
        IF (EXCLU3+EXCLU5) => EXCLUNO THEN Z% = Z%+4: GOTO GOON3
        EXCLU5 = EXCLUNO - EXCLU3' KEEP TRACK OF WHAT IS ON LIST
        PRINT #1, "The hazard of ";HAZTITLE$; " can be experienced during "; LIFTITLE$;
        PRINT #1, " (Number"; EXCLUNO; "on MATRIX 3) ("; DM%; DD%; DY%; ")."
        PRINT #1,: Z% = Z% + 4: GOTO GOODBY' BECAUSE THE ITEM IS ON MATRIX 3
        GOON3: NEXT COUNTER ' FINISH READING THE LIST ON PAGE 51

' "EXCLUSIONS" FILE

GOODBY: CLOSE ' MAKE ENTRY THEN CLOSE EXCLUSION LIST
RESTORE ' RESTORE THE LIST FOR NEXT ITERATION
IF Z% > 0 THEN GOTO FINAL' BECAUSE THE ITEM IS ON THE EXCLUSION LIST
SYSLET$ = PREFIX$ + CHR$(SYSCTR + 64) + "-"' SYSTEM CATAGORY LETTER
OLD% = (NOHAZ+HAZCTR-1)*NOLIF+LIFCTR' OLD HAZARD # FOR THIS ITEM
OLD$  = RIGHT$(STR$(OLD%) , (LEN(STR$(OLD%))-1))' MAKE OLD$ A STRING
SYSTITLE$ = SYSTITLE$ + " can cause or be jeopardized by "
HAZTITLE$ = HAZTITLE$ + " during " ' MAKE UP HAZARD TITLE
CLS: BEEP ' ALERT THE ANALYST TO A NEW HAZARD

'DISPLAY HAZARD NUMBER AND TITLE

PRINT SYSLET$; OLD$; " - 3D MATRIX INTERSECTION #"; MTEST
PRINT SYSTITLE$
PRINT HAZTITLE$
PRINT LIFTITLE$; ".": PRINT' SKIP A LINE
COMMENT$ = "" COMMENT IS A NULL STRING FOR NOW

'SHOULD THE HAZARD BE ANALYZED?

PRINT "Enter comments as follows:" ' ALLOW OPERATOR INPUT
PRINT "1 - "; COMMENT1$ ' THIS HAZARD IS NOT CREDIBLE
PRINT "2 - "; COMMENT2$ ' THIS HAZARD CANNOT BE EVALUATED
PRINT "3 - Perform a hazard analysis on this hazard." ' DO HAZARD ANALYSIS
PRINT "ENTER - No Comment" ' NOTHING IS WRITTEN WITH THIS COMMENT
```

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PRINT "Anything else will be considered comments to be included but not analyzed."

'TELL COMPUTER TO GO TO THE NEXT STEP

ASKIT: LINE INPUT LNE$ ' IF COMMENT IS MORE THAN ONE LINE, ADD LINE
IF LNE$ = "1" + X$ THEN COMMENT$ = COMMENT1$: GOTO FILEIT' FILE COMMENT
IF LNE$ = "2" + X$ THEN COMMENT$ = COMMENT2$: GOTO FILEIT' FILE COMMENT
IF LNE$ = "3" + X$ THEN GOTO ANALYZE ' PERFORM HAZARD ANALYSIS
IF LNE$ = X$ THEN GOTO FILEIT ' TERMINATE COMMENT INPUT
COMMENT$=COMMENT$+LEFT$(LNE$,(LEN(LNE$)-2))+ " "' COMPOSE COMMENT
GOTO ASKIT ' ASK FOR ANOTHER LINE FOR THE COMMENT

'PUT IN "NOT ANALYZED" FILE

FILEIT: OPEN "NOT ANALYZED" FOR APPEND AS #1: WIDTH #1, 255
PRINT#1,SYSLET$; OLD$;" - ";SYSTITLE$; HAZTITLE$; LIFTITLE$; ". -- "; COMMENT$;
PRINT#1," ("; DM%; DD%; DY%; ")": PRINT #1,'SKIP A LINE BETWEEN FILE ENTRIES
CLOSE ' CLOSE THE "NOT ANALYZED" FILE
GOTO FINAL ' SKIP THE OTHER HAZARD ANALYSIS STEPS FOR THIS ITEM
ANALYZE: CLS: BEEP ' ALERT ANALYST TO HAZARD ANALYSIS

'WORKSHEETS FILE

NEWHAZNO% = NEWHAZNO% + 1' INCREMENT NEW HAZARD NUMBER
NEU$=RIGHT$("00"+RIGHT$(STR$(NEWHAZNO%),(LEN(STR$(NEWHAZNO%))-1)),3)
HAW$ = "HAW # " + SYSLET$ + NEU$' THIS IS THE NAME OF WORKSHEET FILE
OPEN HAW$ FOR OUTPUT AS #1: WIDTH #1, 255' MAKE NEW WORKSHEET
PRINT TAB (20)"HAZARD ANALYSIS WORKSHEET": PRINT #1,: PRINT #1,' TITLE
PRINT #1,"                                HAZARD ANALYSIS WORKSHEET"'TITLE ON DISK
PRINT: PRINT #1,' SKIP A LINE
PRINT "HAZARD REPORT NUMBER: "; SYSLET$; NEU$; " ("; SYSLET$; OLD$; ")"
PRINT #1, "HAZARD REPORT NUMBER: ";SYSLET$; NEU$; " ("; SYSLET$; OLD$; ")"
PRINT: PRINT #1,' SKIP A LINE
PRINT "ANALYST/ENGINEER NAME: "; ANALYST$ ' ON SCREEN
PRINT #1, "ANALYST/ENGINEER NAME: "; ANALYST$ ' ALSO ON DISK FILE
PRINT: PRINT #1,' SKIP A LINE
    FOR COUNTER = 1 TO (NOSYS+NOHAZ+NOLIF+HAZSYS+SYSLIF+HAZLIF)
    READ NOTHING$' DISCARD INITIAL DATA UP TO SYSTEM TITLES
    NEXT COUNTER' CONTINUE COUNTING
    FOR COUNTER = 1 TO SYSCTR: READ SYS$' GET THE SYSTEM TITLE
    NEXT COUNTER' GO THROUGH THE LIST OF SYSTEM TITLES
    RESTORE' RESTORE DATA FOR NEXT ITERATION
PRINT "SYSTEM: "; SYS$ ' PRINT SYSTEM TITLE ON SCREEN
PRINT#1, "SYSTEM: "; SYS$: PRINT: PRINT#1, ' SKIP A LINE
PRINT "DATE: "; DM%; "/"; DD%; "/"; DY% ' PRINT DATE ON SCREEN
PRINT #1, "DATE: "; DM%; "/"; DD%; "/"; DY% ' PRINT DATE IN DISK FILE
```

```
PRINT: PRINT#1, ' SKIP A LINE
PRINT "HAZARD TITLE: "; SYSTITLE$' PRINT SYSTEM TITLE ON SCREEN
PRINT HAZTITLE$' PRINT HAZARD TITLE ON SCREEN FOR DESCRIPTION
PRINT LIFTITLE$; "." PRINT LIFE CYCLE TITLE: THIS COMPLETES DESCRIPTION
PRINT #1, "HAZARD TITLE: "; SYSTITLE$; HAZTITLE$; LIFTITLE$; "." ON DISK
PRINT: PRINT#1, ' SKIP A LINE

'INPUT INFORMATION

HAZCOND$ = "" SET HAZARDOUS CONDITION TO NULL STRING FOR NOW
PRINT "HAZARDOUS CONDITION: ";' REQUEST ANALYST INPUT
GOON4: LINE INPUT  HAZCO$' ANALYST TYPE HAZARDOUS CONDITION
IF HAZCO$ = X$ THEN GOTO GOON5 ' TERMINATE COMMENT INPUT
HAZCOND$ = HAZCOND$+LEFT$(HAZCO$,(LEN(HAZCO$)-2))+ " "  COMMENT
GOTO GOON4' IF NOT FINISHED, CONTINUE  TO ADD LINES TO COMMENT
GOON5: PRINT #1, "HAZARDOUS CONDITION: "; HAZCOND$
PRINT: PRINT #1, ' SKIP A LINE
HAZCAUS$ = "" SET HAZARD CAUSE TO NULL STRING FOR NOW
PRINT "HAZARD CAUSE: ";' REQUEST ANALYST INPUT FOR HAZARD CAUSE
GOON6: LINE INPUT  HAZCA$' ANALYST TYPE HAZARD CAUSE
IF HAZCA$ = X$ THEN GOTO GOON7 ' TERMINATE COMMENT INPUT
HAZCAUS$ = HAZCAUS$+LEFT$(HAZCA$,(LEN(HAZCA$)-2))+ " "  COMMENT
GOTO GOON6' IF NOT FINISHED, CONTINUE  TO ADD LINES TO COMMENT
GOON7: PRINT #1, "HAZARD CAUSE: "; HAZCAUS$
PRINT: PRINT #1, ' SKIP A LINE
PRINT "HAZARD EFFECT: "'REQUEST ANALYST INPUT
HAZEFFECT$ = "" SET TO THE NULL SET FOR NOW

'DISPLAY MENU OF SELECTIONS

PRINT "You may select an effect by striking the key indicated" ' SHOW MENU
PRINT "1 - "; EFFECT1$
PRINT "2 - "; EFFECT2$
PRINT "3 - "; EFFECT3$
PRINT "4 - "; EFFECT4$
PRINT "5 - "; EFFECT5$
PRINT "6 - "; EFFECT6$
PRINT "7 - "; EFFECT7$
PRINT "8 - "; EFFECT8$
PRINT "9 - "; EFFECT9$

'INPUT INFORMATION

EFFECT: LINE INPUT HAZEFF$ ' ANALYST INPUT HAZARD EFFECT
IF HAZEFF$ = "1" + X$ THEN HAZEFFECT$ = EFFECT1$: GOTO LEVEL
IF HAZEFF$ = "2" + X$ THEN HAZEFFECT$ = EFFECT2$: GOTO LEVEL
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IF HAZEFF$ = "3" + X$ THEN HAZEFFECT$ = EFFECT3$: GOTO LEVEL
IF HAZEFF$ = "4" + X$ THEN HAZEFFECT$ = EFFECT4$: GOTO LEVEL
IF HAZEFF$ = "5" + X$ THEN HAZEFFECT$ = EFFECT5$: GOTO LEVEL
IF HAZEFF$ = "6" + X$ THEN HAZEFFECT$ = EFFECT6$: GOTO LEVEL
IF HAZEFF$ = "7" + X$ THEN HAZEFFECT$ = EFFECT7$: GOTO LEVEL
IF HAZEFF$ = "8" + X$ THEN HAZEFFECT$ = EFFECT8$: GOTO LEVEL
IF HAZEFF$ = "9" + X$ THEN HAZEFFECT$ = EFFECT9$: GOTO LEVEL
IF HAZEFF$ = X$ THEN GOTO LEVEL ' JUMP OUT AFTER LAST ENTRY
HAZEFFECT$=HAZEFFECT$+LEFT$(HAZEFF$,(LEN(HAZEFF$)-2))+" ": GOTO EFFECT
LEVEL: PRINT #1, "HAZARD EFFECT: "; HAZEFFECT$ ' PRINT TO DISK FILE
PRINT: PRINT #1, ' SKIP A LINE
SELEC: PRINT "Select a HAZARD LEVEL as follows:" ' MENU FOR HAZARD LEVELS
PRINT "1 - Catastrophic"
PRINT "2 - Critical"
PRINT "3 - Controlled"
INPUT; LEVEL%
IF LEVEL% = 1 THEN PRINT #1, "HAZARD LEVEL: Catastrophic": GOTO SAFER
IF LEVEL% = 2 THEN PRINT #1, "HAZARD LEVEL: Critical": GOTO SAFER
IF LEVEL% = 3 THEN PRINT #1, "HAZARD LEVEL: Controlled": GOTO SAFER
BEEP: GOTO SELEC ' REJECT SELECTION IF IT IS NOT ONE OF THE THREE
SAFER: PRINT: PRINT#1, ' SKIP A LINE
SAFREQ$ = "" SET SAFETY REQUIREMENTS TO NULL STRING FOR NOW
PRINT "SAFETY REQUIREMENTS: ";' REQUEST ANALYST INPUT
GOON8: LINE INPUT  SAFTE$' ANALYST TYPE SAFETY REQUIREMENTS
IF SAFTE$ = X$ THEN GOTO RATIONALE ' TERMINATE COMMENT INPUT
SAFREQ$ = SAFREQ$+LEFT$(SAFTE$,(LEN(SAFTE$)-2))+ " "  COMMENT
GOTO GOON8' IF NOT FINISHED, CONTINUE  TO ADD LINES TO COMMENT
RATIONALE: PRINT #1, "SAFETY REQUIREMENTS: "; SAFREQ$
PRINT: PRINT #1, ' SKIP A LINE
PRINT "Select an appropriate RATIONALE from the list or input your own."
PRINT "1 - "; COMMENT3$"
PRINT "2 - "; COMMENT4$"
PRINT "3 - "; COMMENT5$"
PRINT "4 - "; COMMENT6$"
PRINT "5 - "; COMMENT7$"
PRINT "6 - "; COMMENT8$"
RONE: LINE INPUT RESN$ ' ANALYST INPUT COMMENTS
IF RESN$ = "1" + X$ THEN REASON$ = COMMENT3$: GOTO METHODS
IF RESN$ = "2" + X$ THEN REASON$ = COMMENT4$: GOTO METHODS
IF RESN$ = "3" + X$ THEN REASON$ = COMMENT5$: GOTO METHODS
IF RESN$ = "4" + X$ THEN REASON$ = COMMENT6$: GOTO METHODS
IF RESN$ = "5" + X$ THEN REASON$ = COMMENT7$: GOTO METHODS
IF RESN$ = "6" + X$ THEN REASON$ = COMMENT8$: GOTO METHODS
IF RESN$ = X$ THEN GOTO METHODS' JUMP OUT AFTER LAST ENTRY
REASON$ = REASON$ +LEFT$(RESN$,(LEN(RESN$)-2)) + " ": GOTO RONE
METHODS: PRINT #1, "ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: ";
```

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PRINT #1, REASON$' PRINT ANALYST COMMENTS
PRINT: PRINT #1, ' SKIP A LINE
PRINT "Select an appropriate VERIFICATION METHOD from the list or input your own."
METHDS$ = "" ' SET TO THE NULL STRING FOR NOW
PRINT "1 - "; COMMENT9$
PRINT "2 - "; COMMENT10$
PRINT "3 - "; COMMENT11$
PRINT "4 - "; COMMENT12$
PRINT "5 - "; COMMENT13$
PRINT "6 - "; COMMENT14$
PRINT "7 - "; COMMENT15$
PRINT "8 - "; COMMENT16$
PRINT "9 - "; COMMENT17$
PRINT "10 - "; COMMENT18$
PRINT "11 - "; COMMENT19$
METHONE: LINE INPUT COMTS$
IF COMTS$  = "1"+ X$ THEN METHDS$ = COMMENT9$: GOTO ENDING
IF COMTS$  = "2"+ X$ THEN METHDS$ = COMMENT10$: GOTO ENDING
IF COMTS$  = "3"+ X$ THEN METHDS$ = COMMENT11$: GOTO ENDING
IF COMTS$  = "4"+ X$ THEN METHDS$ = COMMENT12$: GOTO ENDING
IF COMTS$  = "5"+ X$ THEN METHDS$ = COMMENT13$: GOTO ENDING
IF COMTS$  = "6"+ X$ THEN METHDS$ = COMMENT14$: GOTO ENDING
IF COMTS$  = "7"+ X$ THEN METHDS$ = COMMENT15$: GOTO ENDING
IF COMTS$  = "8"+ X$ THEN METHDS$ = COMMENT16$: GOTO ENDING
IF COMTS$  = "9"+ X$ THEN METHDS$ = COMMENT17$: GOTO ENDING
IF COMTS$  = "10"+ X$ THEN METHDS$ = COMMENT18$: GOTO ENDING
IF COMTS$  = "11"+ X$ THEN METHDS$ = COMMENT19$: GOTO ENDING
IF COMTS$ = X$ THEN GOTO ENDING
METHDS$ = METHDS$ + LEFT$(COMTS$,(LEN(COMTS$)-2)) + " ": GOTO METHONE
ENDING: PRINT #1, "VERIFICATION METHODS: "; METHDS$ ' PRINT TO DISK FILE

'CREATE RECORD OF HAZARD ANALYSIS

CLOSE ' CLOSE HAZARD ANALYSIS WORKSHEET FILE FOR THIS ITERATION

'HAVE ALL MATRIX STEPS BEEN CONSIDERED?

FINAL: NEXT LIFCTR' EXAMINE THE NEXT LIFE CYCLE
EXCLU5 = HAZCTR' RESET EXCLUSION COUNTER FOR MATRIX 3
PENULT: PRINT "LOOPING THROUGH HAZARD NUMBER"; (HAZCTR+1)
NEXT HAZCTR' EXAMINE THE NEXT COMPOSITE HAZARD
NEWHAZNO% = 0' START AT 0 FOR EACH SYSTEM
EXCLU4 = SYSCTR' RESET EXCLUSION COUNTER FOR MATRIX 2
LAST: PRINT "LOOPING THROUGH SYSTEM NUMBER"; (SYSCTR+1)
NEXT SYSCTR' EXAMINE THE NEXT SYSTEM
END
```

23. CONDUCT OF THE HAZARD ANALYSIS - The hazard analysis was conducted by running PHAROS in several sessions and providing the information prompted by the program. It was found that the number of matrix intersections which could be addressed by the analyst in a single day varied widely, depending on several factors. In addition, a number of unexpected situations were noted.

a. Shortly after the hazard analysis was begun, the recoverable baseline configurations were rejected in favor of expendable boosters. This made hazards associated with events after LRB separation non-credible. It was decided to retain these hazards, since it took little time to consider them and doing so would avoid having to do the analysis all over again if it was later decided to investigate the recoverable concept further.

b. By the time PHAROS encountered hazards associated with the liquid injection system, this system was rejected in favor of proven linear actuator systems. For this reason, there are no hazard analyses for liquid injection systems. PHAROS still produced a list of hazards not analyzed (all of them) and an exclusion list for this system.

c. During the consideration of the liquid injection system, and as a result of having the program step through this system, it was noted that PHAROS was not reading Matrix 3. This was traced to a misplaced statement in the source program. Since PHAROS considers each proposed hazard unless told not to by an exclusion matrix, this situation resulted in a very large number of non-credible hazards, or ones which could not be analyzed, for systems A through L (avionics through liquid injection). This program error did not cause any loss of information and therefore it was decided not to redo the first part of the analysis merely to eliminate the extra non-credible hazards from the list of those not analyzed.

d. It was found that when PHAROS went from one system to the next, it would automatically add to the exclusion list before proposing the first non-excluded hazard. If a session was terminated at hazard number 1056 and a new session was begun at hazard number 529 (the first number for each system), portions of the exclusion list would be duplicated because PHAROS would read the exclusion matrix involved twice. This problem was eliminated by noting at what hazard PHAROS stopped after an interactive session, and choosing that hazard number as the first one to start with in a subsequent session.

e As the number of hazards not analyzed increased, it became obvious that the final list would be much too long to fit on a single disk, and would not be able to be manipulated conveniently as a single document in any case. For this reason, the lists of hazards not analyzed were divided according to system, so that there was a separate list associated with each system. These 26 lists, corresponding to the 26 systems of the LRB that were analyzed, are presented in this document as appendices A through Z. Following these are the exclusion list and hazard analyses.

THESE HAZARDS WERE CONSIDERED BY THE ANALYST BUT
WERE NOT FURTHER ANALYZED FOR THE REASONS GIVEN

LRB-P-A-650 - LRB avionics can cause or be jeopardized by contamination during manufacture and fabrication of subsystems and components. -- Gyroscopes and other sensitive avionics components are manufactured to rigid quality control standards. Quality and reliability are assured byexhaustive test. The state of the the art is such that this hazard, while credible, does not appear to be a real concern. (3 11 88)

LRB-P-A-651 - LRB avionics can cause or be jeopardized by contamination during inspection and test of the LRB and subsystems. -- Inspections and tests are not likely to require opening of the sealed package. Therefore this hazard is not a concern at this time. (3 11 88)

LRB-P-A-653 - LRB avionics can cause or be jeopardized by contamination during acceptance test and checkout prior to delivery to the Government.-- Acceptance tests generally consist of visual inspection and NDE functional evaluation. For this reason, it is not likely that an acceptance test will subject the avionics package to damaging contamination. (3 11 88)

LRB-P-A-654 - LRB avionics can cause or be jeopardized by contamination during test firing of engines and/or the completed booster. -- If the entire booster is test fired, the avionics packages will either not be installed, or will already be sealed. Therefore, the probability of contamination of the avionics at this time is remote. (3 11 88)

LRB-P-A-655 - LRB avionics can cause or be jeopardized by contamination during flight readiness firing (FRF) of the STS vehicle. -- Contamination of avionics in the Orbiter and SRB has not been a problem in the past. Since similar design, manufacture and operational parameters apply to the LRB, it may be assumed that contamination of avionics during FRF will not be a problem. (3 11 88)

LRB-P-A-656 - LRB avionics can cause or be jeopardized by contamination during preparation for shipment of the booster and ship loose hardware. -- This hazard is not credible. (3 11 88)

LRB-P-A-657 - LRB avionics can cause or be jeopardized by contamination during transportation from manufacture to launch site or after recovery. --The avionics package will be designed to withstand the environments experienced during transportation, and will be adequately protected. Therefore, this hazard does not appear to be credible. (3 11 88)

LRB-P-A-658 - LRB avionics can cause or be jeopardized by contamination during storage, including storage of major components. -- The avionics package will be sealed and protected during storage. This hazard therefore does not appear to be

credible. (3 11 88)

LRB-P-A-659 - LRB avionics can cause or be jeopardized by contamination during preflight checkout prior to stacking. -- Unless the preflight checkout involves opening the avionics package, this hazard does not appear to be credible. (3 11 88)

LRB-P-A-660 - LRB avionics can cause or be jeopardized by contamination during vehicle stacking, including ancillary test activities. -- At the currentstate of maturity, this hazard cannot be evaluated. (3 11 88)

LRB-P-A-661 - LRB avionics can cause or be jeopardized by contamination during rollout from the VAB and preloading preparation. -- The avionics package will be sealed against contamination. Therefore this is nota major concern. (3 11 88)

LRB-P-A-662 - LRB avionics can cause or be jeopardized by contamination during propellant loading for test or flight. -- This hazard is not credible. (3 11 88)

LRB-P-A-663 - LRB avionics can cause or be jeopardized by contamination during countdown to liftoff or abort. -- This hazard is not credible. (3 11 88)

LRB-P-A-664 - LRB avionics can cause or be jeopardized by contamination during launch abort activities, including mission postponement (scrub). -- Thishazard is not credible. (3 11 88)

LRB-P-A-665 - LRB avionics can cause or be jeopardized by contamination during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (3 11 88)

LRB-P-A-666 - LRB avionics can cause or be jeopardized by contamination during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (3 11 88)

LRB-P-A-667 - LRB avionics can cause or be jeopardized by contamination during separation of the LRB from the STS vehicle. -- This hazard is not credible. (3 11 88)

LRB-P-A-668 - LRB avionics can cause or be jeopardized by contamination during descent from separation to ocean impact. -- This hazard is not credible. (3 11 88)

LRB-P-A-669 - LRB avionics can cause or be jeopardized by contamination during splashdown events occuring at impact (disposable for expendables). -- SRB boosters have not experienced avionics contamination due to seawaterimmersion in the past. Therefore, it may be assumed that this hazard willbe adequately controlled. However, if the recovery method is different than that currently used for SRBs (assuming expendable boosters), or subjects the LRBs to seawater immersion for a significantly longer period of time, this hazard may have to be reevaluated. (3 11 88)
LRB-P-A-670 - LRB avionics can cause or be jeopardized by contamination during floatation (of recoverable boosters) until recovery. -- At the current state of maturity,

this hazard cannot be evaluated. (3 11 88)

LRB-P-A-671 - LRB avionics can cause or be jeopardized by contamination during recovery activities, including towing, and retrieval of recoverables. --At the current state of maturity, this hazard cannot be evaluated. (3 11 88)

LRB-P-A-672 - LRB avionics can cause or be jeopardized by contamination during refurbishment of reusable components. -- This hazard is essentially the same as that associated with manufacture, and similar precautions would haveto be taken. (3 11 88)

LRB-P-A-681 - LRB avionics can cause or be jeopardized by heat sources during transportation from manufacture to launch site or after recovery. -- The environments encountered during transportation are unlikely to be more severe than those encountered during prelaunch and flight. Therefore this hazard is not a credible concern. (3 11 88)

LRB-P-A-682 - LRB avionics can cause or be jeopardized by heat sources during storage, including storage of major components. -- Since it is likelythat components will be stored in controlled environments, this hazard does not appear credible at this time. (3 11 88)

LRB-P-A-685 - LRB avionics can cause or be jeopardized by heat sources during rollout from the VAB and preloading preparation. -- This hazard is not credible. (3 11 88)

LRB-P-A-686 - LRB avionics can cause or be jeopardized by heat sources during propellant loading for test or flight. -- This hazard is not credible. (3 11 88)

LRB-P-A-687 - LRB avionics can cause or be jeopardized by heat sources during countdown to liftoff or abort. -- This hazard is not credible. (3 11 88)

LRB-P-A-688 - LRB avionics can cause or be jeopardized by heat sources during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (3 11 88)

LRB-P-A-689 - LRB avionics can cause or be jeopardized by heat sources during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (3 11 88)

LRB-P-A-690 - LRB avionics can cause or be jeopardized by heat sources during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (3 11 88)

LRB-P-A-691 - LRB avionics can cause or be jeopardized by heat sources during separation of the LRB from the STS vehicle. -- This hazard is not credible. (3 11 88)

LRB-P-A-692 - LRB avionics can cause or be jeopardized by heat sources during descent from separation to ocean impact. -- This hazard is not credible. (3 11 88)

LRB-P-A-746 - LRB avionics can cause or be jeopardized by electrical system malfunction during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (3 11 88)

LRB-P-A-747 - LRB avionics can cause or be jeopardized by electrical system malfunction during inspection and test of the LRB and subsystems. -- Equipment used to test avionics can be expected to be designed not to jeopardize the avionics. Therefore this hazard is not a concern at this time. (3 11 88)

LRB-P-A-749 - LRB avionics can cause or be jeopardized by electrical system malfunction during acceptance test and checkout prior to delivery to the Government. -- This hazard is essentially the same as A-747; the sameconsiderations apply. (3 11 88)

LRB-P-A-750 - LRB avionics can cause or be jeopardized by electrical system malfunction during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (3 11 88)

LRB-P-A-752 - LRB avionics can cause or be jeopardized by electrical system malfunction during preparation for shipment of the booster and ship loose hardware. -- This hazard is not credible. (3 11 88)

LRB-P-A-753 - LRB avionics can cause or be jeopardized by electrical system malfunction during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (3 11 88)

LRB-P-A-754 - LRB avionics can cause or be jeopardized by electrical system malfunction during storage, including storage of major components. --This hazard is the same as A-753; the same considerations apply. (3 11 88)

LRB-P-A-755 - LRB avionics can cause or be jeopardized by electrical system malfunction during preflight checkout prior to stacking. -- This is the same as A-747; the same considerations apply. (3 11 88)

LRB-P-A-756 - LRB avionics can cause or be jeopardized by electrical system malfunction during vehicle stacking, including ancillary test activities. -- This hazard is the same as A-747; similar considerations apply. (3 11 88)

LRB-P-A-757 - LRB avionics can cause or be jeopardized by electrical system malfunction during rollout from the VAB and preloading preparation. --This hazard is essentially the same as A-753; similar considerations apply. (3 11 88)

LRB-P-A-758 - LRB avionics can cause or be jeopardized by electrical system

malfunction during propellant loading for test or flight. -- This hazard relates to the capability of the launch facility to handle the additional electrical requirements of loading the boosters. While this will undoubtedly require a substantial increase in the complexity of the controls at the launch facility, this hazard cannot be further evaluated at this time.(3 11 88)

LRB-P-A-759 - LRB avionics can cause or be jeopardized by electrical system malfunction during countdown to liftoff or abort. -- This hazard is essentially the same as A-758, and cannot be reasonably evaluated at this time. (3 11 88)

LRB-P-A-760 - LRB avionics can cause or be jeopardized by electrical system malfunction during launch abort activities, including mission postponement (scrub). -- This is essentially the same hazard as A-758; similar considerations apply. (3 11 88)

LRB-P-A-762 - LRB avionics can cause or be jeopardized by electrical system malfunction during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (3 11 88)

LRB-P-A-763 - LRB avionics can cause or be jeopardized by electrical system malfunction during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (3 11 88)

LRB-P-A-764 - LRB avionics can cause or be jeopardized by electrical system malfunction during descent from separation to ocean impact. -- This hazard is not credible. (3 11 88)

LRB-P-A-765 - LRB avionics can cause or be jeopardized by electrical system malfunction during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (3 11 88)

LRB-P-A-766 - LRB avionics can cause or be jeopardized by electrical system malfunction during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (3 14 88)

LRB-P-A-767 - LRB avionics can cause or be jeopardized by electrical system malfunction during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (3 14 88)

LRB-P-A-768 - LRB avionics can cause or be jeopardized by electrical system malfunction during refurbishment of reusable components. -- This hazard is essentially the same as A-746; similar considerations apply. (3 14 88)

LRB-P-A-801 - LRB avionics can cause or be jeopardized by vibration, acoustic loads or shock during transportation from manufacture to launch site or after recovery. -- (3 14 88)

LRB-P-A-808 - LRB avionics can cause or be jeopardized by vibration, acoustic loads or shock during launch abort activities, including mission postponement (scrub). -- Launch abort does not appear to present as severe an environment as a FRF. If the avionics will withstand FRF, they may be assumed to be capable of withstanding smaller periods of on-pad firing. (3 14 88)

LRB-P-A-809 - LRB avionics can cause or be jeopardized by vibration, acoustic loads or shock during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (3 14 88)

LRB-P-A-810 - LRB avionics can cause or be jeopardized by vibration, acoustic loads or shock during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (3 14 88)

LRB-P-A-812 - LRB avionics can cause or be jeopardized by vibration, acoustic loads or shock during descent from separation to ocean impact. -- If the avionics are recoverable, it may be assumed that they will be subject to essentially the same loads which have been withstood by the SRB avionics in the past. Therefore, this does not appear to be a credible concern. (3 14 88)

LRB-P-A-813 - LRB avionics can cause or be jeopardized by vibration, acoustic loads or shock during splashdown events occuring at impact (disposable for expendables). -- This loading appears to be essentially the same as for the SRBs, and does not appear to be a concern. (3 14 88)

LRB-P-A-815 - LRB avionics can cause or be jeopardized by vibration, acoustic loads or shock during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (3 14 88)

LRB-P-A-962 - LRB avionics can cause or be jeopardized by computer system malfunction during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (3 14 88)

LRB-P-A-965 - LRB avionics can cause or be jeopardized by computer system malfunction during acceptance test and checkout prior to delivery to the Government. -- This hazard is the same as A-963; similar considerations apply. (3 14 88)

LRB-P-A-966 - LRB avionics can cause or be jeopardized by computer system malfunction during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (3 14 88)

LRB-P-A-967 - LRB avionics can cause or be jeopardized by computer system malfunction during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (3 14 88)

LRB-P-A-969 - LRB avionics can cause or be jeopardized by computer system

malfunction during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (3 14 88)

LRB-P-A-970 - LRB avionics can cause or be jeopardized by computer system malfunction during storage, including storage of major components. -- This hazard is not credible. (3 14 88)

LRB-P-A-972 - LRB avionics can cause or be jeopardized by computer system malfunction during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (3 14 88)

LRB-P-A-973 - LRB avionics can cause or be jeopardized by computer system malfunction during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (3 14 88)

LRB-P-A-974 - LRB avionics can cause or be jeopardized by computer system malfunction during propellant loading for test or flight. -- Loading is likely to be accomplished in much the same way as the ET is loaded. There are sufficient backups to automated systems, verified by preflight loading tests, that this hazard does not appear to be a valid concern. (3 14 88)

LRB-P-A-976 - LRB avionics can cause or be jeopardized by computer system malfunction during launch abort activities, including mission postponement (scrub). -- This is the same as A-975; similar considerations apply. (3 14 88)

LRB-P-A-978 - LRB avionics can cause or be jeopardized by computer system malfunction during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is essentially the same as A-977; similar considerations apply. (3 14 88)

LRB-P-A-980 - LRB avionics can cause or be jeopardized by computer system malfunction during descent from separation to ocean impact. -- At present, the method of descent rate control and/or parachute deployment has not been specified. It is likely that a microprocessor-controlled system would be the logical choice for descent management, but lack of firm criteria for this system does not permit meaningful analysis of this hazard at this time. (3 14 88)

LRB-P-A-981 - LRB avionics can cause or be jeopardized by computer system malfunction during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (3 14 88)

LRB-P-A-982 - LRB avionics can cause or be jeopardized by computer system malfunction during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (3 14 88)

LRB-P-A-983 - LRB avionics can cause or be jeopardized by computer system

malfunction during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (3 14 88)

LRB-P-A-984 - LRB avionics can cause or be jeopardized by computer system malfunction during refurbishment of reusable components. -- This hazard is not credible. (3 14 88)

LRB-P-A-1013 - LRB avionics can cause or be jeopardized by wear during acceptance test and checkout prior to delivery to the Government. -- Acceptance tests for avionics packages have not been defined. Therefore, it is not possible to effectively analyze this hazard at this time. (3 14 88)

LRB-P-A-1014 - LRB avionics can cause or be jeopardized by wear during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (3 14 88)

LRB-P-A-1015 - LRB avionics can cause or be jeopardized by wear during flight readiness firing (FRF) of the STS vehicle. -- This is essentially the same hazard as A-1011; similar considerations apply. (3 14 88)

LRB-P-A-1017 - LRB avionics can cause or be jeopardized by wear during transportation from manufacture to launch site or after recovery. -- Although this is a credible hazard, it is anticipated that sensitive components will be packed and shipped in such a manner that they are adequately protected. Therefore, this hazard does not appear to be a concern at this time. (3 14 88)

LRB-P-A-1020 - LRB avionics can cause or be jeopardized by wear during vehicle stacking, including ancillary test activities. -- This is essentially the same hazard as A-1011; similar considerations apply. (3 14 88)

LRB-P-A-1021 - LRB avionics can cause or be jeopardized by wear during rollout from the VAB and preloading preparation. -- This hazard is not credible. (3 14 88)

LRB-P-A-1022 - LRB avionics can cause or be jeopardized by wear during propellant loading for test or flight. -- This hazard is not credible. (3 14 88)

LRB-P-A-1023 - LRB avionics can cause or be jeopardized by wear during countdown to liftoff or abort. -- This hazard is essentially the same as A-1011, except that the most severe wear environments are likely to be encountered when gyros are at flight RPM. (3 14 88)

LRB-P-A-1024 - LRB avionics can cause or be jeopardized by wear during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (3 14 88)

LRB-P-A-1025 - LRB avionics can cause or be jeopardized by wear during nominal

flight from liftoff to LRB burnout. -- This hazard is not credible, since this is the design condition. (3 14 88)

LRB-P-A-1026 - LRB avionics can cause or be jeopardized by wear during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (3 14 88)

LRB-P-A-1027 - LRB avionics can cause or be jeopardized by wear during separation of the LRB from the STS vehicle. -- This hazard is not credible. (3 14 88)

LRB-P-A-1028 - LRB avionics can cause or be jeopardized by wear during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (3 14 88)

LRB-P-A-1029 - LRB avionics can cause or be jeopardized by wear during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (3 14 88)

LRB-P-A-1031 - LRB avionics can cause or be jeopardized by wear during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (3 14 88)

LRB-P-A-1032 - LRB avionics can cause or be jeopardized by wear during refurbishment of reusable components. -- This hazard is not credible. (3 14 88)

LRB-P-A-1034 - LRB avionics can cause or be jeopardized by emergencies during manufacture and fabrication of subsystems and components. -- This hazard is not credible. (3 14 88)

LRB-P-A-1035 - LRB avionics can cause or be jeopardized by emergencies during inspection and test of the LRB and subsystems. -- This hazard is not credible. (3 14 88)

LRB-P-A-1037 - LRB avionics can cause or be jeopardized by emergencies during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (3 14 88)

LRB-P-A-1038 - LRB avionics can cause or be jeopardized by emergencies during test firing of engines and/or the completed booster. -- This hazard is not credible. (3 14 88)

LRB-P-A-1039 - LRB avionics can cause or be jeopardized by emergencies during flight readiness firing (FRF) of the STS vehicle. -- This hazard is not credible. (3 14 88)

LRB-P-A-1040 - LRB avionics can cause or be jeopardized by emergencies during preparation for shipment of the booster and ship loose hardware. -- This hazard is

not credible. (3 14 88)

LRB-P-A-1041 - LRB avionics can cause or be jeopardized by emergencies during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (3 14 88)

LRB-P-A-1042 - LRB avionics can cause or be jeopardized by emergencies during storage, including storage of major components. -- This hazard is not credible. (3 14 88)

LRB-P-A-1043 - LRB avionics can cause or be jeopardized by emergencies during preflight checkout prior to stacking. -- This hazard is not credible. (3 14 88)

LRB-P-A-1044 - LRB avionics can cause or be jeopardized by emergencies during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (3 14 88)

LRB-P-A-1045 - LRB avionics can cause or be jeopardized by emergencies during rollout from the VAB and preloading preparation. -- This hazard is not credible. (3 14 88)

LRB-P-A-1046 - LRB avionics can cause or be jeopardized by emergencies during propellant loading for test or flight. -- This hazard is not credible. (3 14 88)

LRB-P-A-1047 - LRB avionics can cause or be jeopardized by emergencies during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (3 14 88)

LRB-P-A-1048 - LRB avionics can cause or be jeopardized by emergencies during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (3 14 88)

LRB-P-A-1049 - LRB avionics can cause or be jeopardized by emergencies during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (3 14 88)

LRB-P-A-1050 - LRB avionics can cause or be jeopardized by emergencies during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (3 14 88)

LRB-P-A-1051 - LRB avionics can cause or be jeopardized by emergencies during separation of the LRB from the STS vehicle. -- A significant difference between the LRBs and SRBs is that in an emergency, LRB thrust can be terminated and the separation sequence can be intiated. SRB avionics do not have to deal with the problem of guiding a separated but unspent booster; the LRB avionics do. It as assumed at present that the avionics package design will incorporate provisions for

safe early separation from the STS vehicle. (3 14 88)

LRB-P-A-1052 - LRB avionics can cause or be jeopardized by emergencies during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (3 14 88)

LRB-P-A-1053 - LRB avionics can cause or be jeopardized by emergencies during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (3 14 88)

LRB-P-A-1054 - LRB avionics can cause or be jeopardized by emergencies during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (3 14 88)

LRB-P-A-1055 - LRB avionics can cause or be jeopardized by emergencies during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (3 14 88)

LRB-P-A-1056 - LRB avionics can cause or be jeopardized by emergencies during refurbishment of reusable components. -- This hazard is not credible. (3 14 88)

THESE HAZARDS WERE CONSIDERED BY THE ANALYST BUT WERE NOT FURTHER ANALYZED FOR THE REASONS GIVEN

LRB-P-B-530 - The booster separation system can cause or be jeopardized by hazardous environments during manufacture and fabrication of subsystems and components. -- Although the separation rocket motors of the booster separation system are not particularly hazardous, they do contain pyrotechnic components which require storage in approved explosive containment bunkers. These must be available at the site where the separation motors are incorporated into the completed boosters. (3 14 88)

LRB-P-B-531 - The booster separation system can cause or be jeopardized by hazardous environments during inspection and test of the LRB and subsystems. -- Incorporation of the separation motors into the completed booster will require that pyrotechnic storage and handling procedures be employed after that time. It is presumed that techniques similar to those employed for the SRB will be adequate. (3 14 88)

LRB-P-B-533 - The booster separation system can cause or be jeopardized by hazardous environments during acceptance test and checkout prior to delivery to the Government. -- Configuration at time of delivery has not been specified; therefore this hazard cannot be adequately analyzed at this time. (3 14 88)

LRB-P-B-534 - The booster separation system can cause or be jeopardized by hazardous environments during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (3 15 88)

LRB-P-B-535 - The booster separation system can cause or be jeopardized by hazardous environments during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (3 15 88)

LRB-P-B-536 - The booster separation system can cause or be jeopardized by hazardous environments during preparation for shipment of the booster and ship loose hardware. -- If the booster vehicle has the separation ordnance installed, it will be necessary for access to be restricted and safe distance criteria to be observed. This does not appear to be a hazard at this time. (3 15 88)

LRB-P-B-537 - The booster separation system can cause or be jeopardized by hazardous environments during transportation from manufacture to launch site or after recovery. -- Transportation of means for booster separation motors has already been established for the SRB motors, and is not likely to be materially different for the LRB. It is anticipated that separation motors will be installed at the launch site, where adequate procedures for dealing with ordnance have already been established and tested. (3 15 88)

LRB-P-B-538 - The booster separation system can cause or be jeopardized by

hazardous environments during storage, including storage of major components. -- Storage conditions have already been established for separation motors for the SRB. Since there have been no serious problems with storage, it is not anticipated that there will be any for the separation motors for the LRB. (3 15 88)

LRB-P-B-539 - The booster separation system can cause or be jeopardized by hazardous environments during preflight checkout prior to stacking. -- Preflight checkout for the LRB separation system should not be materially different from that for the SRB system. (3 15 88)

LRB-P-B-540 - The booster separation system can cause or be jeopardized by hazardous environments during vehicle stacking, including ancillary test activities. -- Similar procedures for safety around the booster separation motors are expected to be observed for the LRB as are now established for the SRB. (3 15 88)

LRB-P-B-541 - The booster separation system can cause or be jeopardized by hazardous environments during rollout from the VAB and preloading preparation. -- Historical data for the SRBs indicates that this is not likely to be a problem. (3 15 88)

LRB-P-B-542 - The booster separation system can cause or be jeopardized by hazardous environments during propellant loading for test or flight. -- This hazard is not credible. (3 15 88)

LRB-P-B-543 - The booster separation system can cause or be jeopardized by hazardous environments during countdown to liftoff or abort. -- This hazard is not credible. (3 15 88)

LRB-P-B-544 - The booster separation system can cause or be jeopardized by hazardous environments during launch abort activities, including mission postponement (scrub). -- The booster separation system will have to be safed if launch is aborted. Since this is already done for the SRBs, this does not appear to be a problem. (3 15 88)

LRB-P-B-545 - The booster separation system can cause or be jeopardized by hazardous environments during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (3 15 88)

LRB-P-B-546 - The booster separation system can cause or be jeopardized by hazardous environments during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (3 15 88)

LRB-P-B-552 - The booster separation system can cause or be jeopardized by hazardous environments during refurbishment of reusable components. -- This hazard is not credible. (3 15 88)

LRB-P-B-673 - The booster separation system can cause or be jeopardized by heat

sources during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (3 15 88)

LRB-P-B-674 - The booster separation system can cause or be jeopardized by heat sources during manufacture and fabrication of subsystems and components. -- This hazard relates to the industrial safety program of the rocket motor manufacturer. (3 15 88)

LRB-P-B-675 - The booster separation system can cause or be jeopardized by heat sources during inspection and test of the LRB and subsystems. -- This hazard is not credible. There are no foreseen inspection steps with the separation motor installed that require or employ heat sources. (3 15 88)

LRB-P-B-677 - The booster separation system can cause or be jeopardized by heat sources during acceptance test and checkout prior to delivery to the Government. -- This hazard is essentially the same as A-676; the same considerations apply. (3 15 88)

LRB-P-B-678 - The booster separation system can cause or be jeopardized by heat sources during test firing of engines and/or the completed booster. -- It is unlikely that the separation motors would be installed during test firing of the completed booster, except for a FRF. (3 15 88)

LRB-P-B-680 - The booster separation system can cause or be jeopardized by heat sources during preparation for shipment of the booster and ship loose hardware. -- This hazard is not credible. (3 15 88)

LRB-P-B-681 - The booster separation system can cause or be jeopardized by heat sources during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (3 15 88)

LRB-P-B-682 - The booster separation system can cause or be jeopardized by heat sources during storage, including storage of major components. -- Storage can be expected to be controlled to the extent that heat sources which could jeopardize the separation motors are excluded. Storage of the motors will require an approved ordnance bunker. (3 15 88)

LRB-P-B-683 - The booster separation system can cause or be jeopardized by heat sources during preflight checkout prior to stacking. -- This hazard is not credible. (3 15 88)

LRB-P-B-684 - The booster separation system can cause or be jeopardized by heat sources during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (3 15 88)

LRB-P-B-685 - The booster separation system can cause or be jeopardized by heat

sources during rollout from the VAB and preloading preparation. -- This hazard is not credible. (3 15 88)

LRB-P-B-686 - The booster separation system can cause or be jeopardized by heat sources during propellant loading for test or flight. -- This hazard is not credible. (3 15 88)

LRB-P-B-687 - The booster separation system can cause or be jeopardized by heat sources during countdown to liftoff or abort. -- Liftoff or abort heat loading from the SSMEs and LRB motors are expected to be transitory. The separation system design will be driven by the requirement to withstand flight and on-pad abort heat loads. (3 15 88)

LRB-P-B-688 - The booster separation system can cause or be jeopardized by heat sources during launch abort activities, including mission postponement (scrub). -- This hazard is essentially the same as B-687; similar considerations apply. (3 15 88)

LRB-P-B-689 - The booster separation system can cause or be jeopardized by heat sources during nominal flight from liftoff to LRB burnout. -- This is the design condition. If current separation motors are used, it will be necessary to verify that the heat loads in the vicinity of the separation systems (forward and aft) are tolerable by the current separation motor configuration. (3 15 88)

LRB-P-B-690 - The booster separation system can cause or be jeopardized by heat sources during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (3 15 88)

LRB-P-B-696 - The booster separation system can cause or be jeopardized by heat sources during refurbishment of reusable components. -- This hazard is not credible. (3 15 88)

LRB-P-B-745 - The booster separation system can cause or be jeopardized by electrical system malfunction during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (3 15 88)

LRB-P-B-746 - The booster separation system can cause or be jeopardized by electrical system malfunction during manufacture and fabrication of subsystems and components. -- Although this a industrial safety concern, the history of booster separation motor manufacture indicates that this concern has been adequately resolved. (3 15 88)

LRB-P-B-749 - The booster separation system can cause or be jeopardized by electrical system malfunction during acceptance test and checkout prior to delivery to the Government. -- Acceptance tests are not likely to involve electrical checkout of the booster vehicle with separation motors installed. If the test does involve electrical

checkout, this hazard is essentially the same as B-747, and similar considerations apply. (3 15 88)

LRB-P-B-750 - The booster separation system can cause or be jeopardized by electrical system malfunction during test firing of engines and/or the completed booster. -- It is unlikely that separation motors will be installed during test firing. If they are, this hazard is essentially the same as B-747. (3 15 88)

LRB-P-B-751 - The booster separation system can cause or be jeopardized by electrical system malfunction during flight readiness firing (FRF) of the STS vehicle. -- At this stage of design maturity, it may be assumed that the safing method used on the SRB separation motors will be adequate for the LRB. (3 15 88)

LRB-P-B-752 - The booster separation system can cause or be jeopardized by electrical system malfunction during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (3 15 88)

LRB-P-B-753 - The booster separation system can cause or be jeopardized by electrical system malfunction during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (3 15 88)

LRB-P-B-754 - The booster separation system can cause or be jeopardized by electrical system malfunction during storage, including storage of major components. -- This hazard is not credible. (3 15 88)

LRB-P-B-755 - The booster separation system can cause or be jeopardized by electrical system malfunction during preflight checkout prior to stacking. -- This hazard is essentially the same as B-747; similar consideration apply. (3 15 88)

LRB-P-B-756 - The booster separation system can cause or be jeopardized by electrical system malfunction during vehicle stacking, including ancillary test activities. -- To the extent that this hazard exists, it is the same as B-747. (3 15 88)

LRB-P-B-757 - The booster separation system can cause or be jeopardized by electrical system malfunction during rollout from the VAB and preloading preparation. -- Considerations of B-747 apply. (3 15 88)

LRB-P-B-758 - The booster separation system can cause or be jeopardized by electrical system malfunction during propellant loading for test or flight. -- Although there will be a greater number of interfaces between the launch facility, the Orbiter and the LRB, at this time it may be assumed that the means by which the SRB separation motors are safed during propellant loading will be sufficient for the LRB. (3 15 88)

LRB-P-B-759 - The booster separation system can cause or be jeopardized by

electrical system malfunction during countdown to liftoff or abort. -- This hazard is essentially the same as B-758; similar considerations apply. (3 15 88)

LRB-P-B-762 - The booster separation system can cause or be jeopardized by electrical system malfunction during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (3 15 88)

LRB-P-B-768 - The booster separation system can cause or be jeopardized by electrical system malfunction during refurbishment of reusable components. -- This hazard is not credible. (3 15 88)

LRB-P-B-793 - The booster separation system can cause or be jeopardized by vibration, acoustic loads or shock during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (3 15 88)

LRB-P-B-794 - The booster separation system can cause or be jeopardized by vibration, acoustic loads or shock during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (3 15 88)

LRB-P-B-795 - The booster separation system can cause or be jeopardized by vibration, acoustic loads or shock during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (3 15 88)

LRB-P-B-797 - The booster separation system can cause or be jeopardized by vibration, acoustic loads or shock during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (3 15 88)

LRB-P-B-798 - The booster separation system can cause or be jeopardized by vibration, acoustic loads or shock during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (3 15 88)

LRB-P-B-799 - The booster separation system can cause or be jeopardized by vibration, acoustic loads or shock during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (3 15 88)

LRB-P-B-800 - The booster separation system can cause or be jeopardized by vibration, acoustic loads or shock during preparation for shipment of the booster and ship loose hardware. -- This hazard is not credible. (3 15 88)

LRB-P-B-801 - The booster separation system can cause or be jeopardized by vibration, acoustic loads or shock during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (3 15 88)

LRB-P-B-802 - The booster separation system can cause or be jeopardized by

vibration, acoustic loads or shock during storage, including storage of major components. -- This hazard is not credible. (3 15 88)

LRB-P-B-803 - The booster separation system can cause or be jeopardized by vibration, acoustic loads or shock during preflight checkout prior to stacking. -- This hazard is not credible. (3 15 88)

LRB-P-B-804 - The booster separation system can cause or be jeopardized by vibration, acoustic loads or shock during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (3 15 88)

LRB-P-B-805 - The booster separation system can cause or be jeopardized by vibration, acoustic loads or shock during rollout from the VAB and preloading preparation. -- This hazard is not credible. (3 15 88)

LRB-P-B-806 - The booster separation system can cause or be jeopardized by vibration, acoustic loads or shock during propellant loading for test or flight. -- This hazard is not credible. (3 15 88)

LRB-P-B-807 - The booster separation system can cause or be jeopardized by vibration, acoustic loads or shock during countdown to liftoff or abort. -- This hazard is not credible. (3 15 88)

LRB-P-B-808 - The booster separation system can cause or be jeopardized by vibration, acoustic loads or shock during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (3 15 88)

LRB-P-B-809 - The booster separation system can cause or be jeopardized by vibration, acoustic loads or shock during nominal flight from liftoff to LRB burnout. -- This is the design condition; therefore this hazard is to be specifically eliminated by design. (3 15 88)

LRB-P-B-810 - The booster separation system can cause or be jeopardized by vibration, acoustic loads or shock during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (3 15 88)

LRB-P-B-811 - The booster separation system can cause or be jeopardized by vibration, acoustic loads or shock during separation of the LRB from the STS vehicle. -- This hazard is evaluated as A-811. (3 15 88)

LRB-P-B-816 - The booster separation system can cause or be jeopardized by vibration, acoustic loads or shock during refurbishment of reusable components. -- This hazard is not credible. (3 15 88)

LRB-P-B-889 - The booster separation system can cause or be jeopardized by

lightning or electromagnetic discharge during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (3 15 88)

LRB-P-B-890 - The booster separation system can cause or be jeopardized by lightning or electromagnetic discharge during manufacture and fabrication of subsystems and components. -- It is assumed that booster separation pyrotechnics will be stored in approved grounded ordnance storage bunkers to prevent ignition by lightning or static discharge. (3 15 88)

LRB-P-B-891 - The booster separation system can cause or be jeopardized by lightning or electromagnetic discharge during inspection and test of the LRB and subsystems. -- It is assumed that such testing will take place indoors where the booster and its associated components are protected from the effects of lightning. (3 15 88)

LRB-P-B-893 - The booster separation system can cause or be jeopardized by lightning or electromagnetic discharge during acceptance test and checkout prior to delivery to the Government. -- It is expected that boosters will be stored indoors and protected from lightning or static discharge during acceptance testing. (3 15 88)

LRB-P-B-894 - The booster separation system can cause or be jeopardized by lightning or electromagnetic discharge during test firing of engines and/or the completed booster. -- It is not expected that the booster separation system will be installed during test firing. Although a lightning strike could damage electrical circuits which are part of the separation motor ignition system, this is not considered to be a problem specific to the this system alone. (3 15 88)

LRB-P-B-896 - The booster separation system can cause or be jeopardized by lightning or electromagnetic discharge during preparation for shipment of the booster and ship loose hardware. -- This hazard is not credible. (3 15 88)

LRB-P-B-897 - The booster separation system can cause or be jeopardized by lightning or electromagnetic discharge during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (3 15 88)

LRB-P-B-898 - The booster separation system can cause or be jeopardized by lightning or electromagnetic discharge during storage, including storage of major components. -- Protected storage is expected; therefore this hazard is not credible. (3 15 88)

LRB-P-B-899 - The booster separation system can cause or be jeopardized by lightning or electromagnetic discharge during preflight checkout prior to stacking. -- This hazard is not credible. (3 15 88)

LRB-P-B-900 - The booster separation system can cause or be jeopardized by

lightning or electromagnetic discharge during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (3 15 88)

LRB-P-B-902 - The booster separation system can cause or be jeopardized by lightning or electromagnetic discharge during propellant loading for test or flight. -- This is essentially the same hazard as B-895; similar considerations apply. (3 15 88)

LRB-P-B-904 - The booster separation system can cause or be jeopardized by lightning or electromagnetic discharge during launch abort activities, including mission postponement (scrub). -- This is essentially the same hazard as B-903 (3 15 88)

LRB-P-B-905 - The booster separation system can cause or be jeopardized by lightning or electromagnetic discharge during nominal flight from liftoff to LRB burnout. -- This hazard is considered to be similar to that which is minimized by design of the SRB. It is expected that similar design constraints will be employed for the LRB as well. (3 15 88)

LRB-P-B-906 - The booster separation system can cause or be jeopardized by lightning or electromagnetic discharge during intact abort, including RTLS, TAL, AOA and ATO. -- This is essentially the same as B-905; similar considerations apply. (3 15 88)

LRB-P-B-907 - The booster separation system can cause or be jeopardized by lightning or electromagnetic discharge during separation of the LRB from the STS vehicle. -- Lightning is not a problem at separation altitude. (3 15 88)

LRB-P-B-912 - The booster separation system can cause or be jeopardized by lightning or electromagnetic discharge during refurbishment of reusable components. -- This hazard is not credible. (3 15 88)

LRB-P-B-961 - The booster separation system can cause or be jeopardized by computer system malfunction during component or material purchase, including acquisition of GFP. -- At the current state of maturity, this hazard cannot be evaluated. (3 15 88)

LRB-P-B-962 - The booster separation system can cause or be jeopardized by computer system malfunction during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (3 15 88)

LRB-P-B-963 - The booster separation system can cause or be jeopardized by computer system malfunction during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (3 15 88)

LRB-P-B-965 - The booster separation system can cause or be jeopardized by computer system malfunction during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (3 15 88)

LRB-P-B-966 - The booster separation system can cause or be jeopardized by computer system malfunction during test firing of engines and/or the completed booster. -- This hazard is essentially the same as that associated with electrical malfunction and the same considerations apply. (3 15 88)

LRB-P-B-967 - The booster separation system can cause or be jeopardized by computer system malfunction during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (3 15 88)

LRB-P-B-968 - The booster separation system can cause or be jeopardized by computer system malfunction during preparation for shipment of the booster and ship loose hardware. -- This hazard is not credible. (3 15 88)

LRB-P-B-969 - The booster separation system can cause or be jeopardized by computer system malfunction during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (3 15 88)

LRB-P-B-970 - The booster separation system can cause or be jeopardized by computer system malfunction during storage, including storage of major components. -- This hazard is not credible. (3 15 88)

LRB-P-B-971 - The booster separation system can cause or be jeopardized by computer system malfunction during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (3 15 88)

LRB-P-B-972 - The booster separation system can cause or be jeopardized by computer system malfunction during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (3 15 88)

LRB-P-B-973 - The booster separation system can cause or be jeopardized by computer system malfunction during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (3 15 88)

LRB-P-B-974 - The booster separation system can cause or be jeopardized by computer system malfunction during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (3 15 88)

LRB-P-B-975 - The booster separation system can cause or be jeopardized by computer system malfunction during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (3 15 88)

LRB-P-B-976 - The booster separation system can cause or be jeopardized by computer system malfunction during launch abort activities, including mission postponement (scrub). -- This is essentially the same hazard as B-760; similar considerations apply. (3 16 88)

LRB-P-B-977 - The booster separation system can cause or be jeopardized by computer system malfunction during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (3 16 88)

LRB-P-B-978 - The booster separation system can cause or be jeopardized by computer system malfunction during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (3 16 88)

LRB-P-B-984 - The booster separation system can cause or be jeopardized by computer system malfunction during refurbishment of reusable components. -- This hazard appears to pertain to computer-controlled manufacturing and test equipment, and cannot be evaluated at this time. (3 16 88)

LRB-P-B-985 - The booster separation system can cause or be jeopardized by operator error during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (3 16 88)

LRB-P-B-986 - The booster separation system can cause or be jeopardized by operator error during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (3 16 88)

LRB-P-B-989 - The booster separation system can cause or be jeopardized by operator error during acceptance test and checkout prior to delivery to the Government. -- This hazard is essentially the same as B-987; similar considerations apply. (3 16 88)

LRB-P-B-990 - The booster separation system can cause or be jeopardized by operator error during test firing of engines and/or the completed booster. -- The same considerations as B-987 apply to this hazard. (3 16 88)

LRB-P-B-991 - The booster separation system can cause or be jeopardized by operator error during flight readiness firing (FRF) of the STS vehicle. -- It is assumed that the electronic systems which interface between the LRB and the ground will not permit any combination of operator inputs to fire the separation motors on the pad. (3 16 88)

LRB-P-B-992 - The booster separation system can cause or be jeopardized by operator error during preparation for shipment of the booster and ship loose hardware. -- Booster separation motors are critical components and therefore must be handled with care. It is assumed that special handling requirements for all pyrotechnics will be in effect. (3 16 88)

LRB-P-B-993 - The booster separation system can cause or be jeopardized by operator error during transportation from manufacture to launch site or after recovery. -- Controls for this hazard are explained in B-992. (3 16 88)

LRB-P-B-994 - The booster separation system can cause or be jeopardized by operator error during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (3 16 88)

LRB-P-B-995 - The booster separation system can cause or be jeopardized by operator error during preflight checkout prior to stacking. -- This hazard is essentially the same as B-987; similar considerations apply. (3 16 88)

LRB-P-B-996 - The booster separation system can cause or be jeopardized by operator error during vehicle stacking, including ancillary test activities. -- This hazard is the same as B-992. (3 16 88)

LRB-P-B-997 - The booster separation system can cause or be jeopardized by operator error during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (3 16 88)

LRB-P-B-998 - The booster separation system can cause or be jeopardized by operator error during propellant loading for test or flight. -- It is assumed that the launch facility will not permit any combination of operator inputs to initiate the separation sequence while the STS vehicle is on the ground. (3 16 88)

LRB-P-B-999 - The booster separation system can cause or be jeopardized by operator error during countdown to liftoff or abort. -- This is the same hazard as B-998 (3 16 88)

LRB-P-B-1000 - The booster separation system can cause or be jeopardized by operator error during launch abort activities, including mission postponement (scrub). -- The effects of this hazard are covered in B-760. A hardware/software sneak circuit analysis must be conducted to insure that it is not possible for the separation sequence to be initated while the vehicle is on the ground. (3 16 88)

LRB-P-B-1002 - The booster separation system can cause or be jeopardized by operator error during intact abort, including RTLS, TAL, AOA and ATO. -- This is the same hazard as B-1001; the same considerations apply. (3 16 88)

LRB-P-B-1003 - The booster separation system can cause or be jeopardized by operator error during separation of the LRB from the STS vehicle. -- This hazard is not credible. (3 16 88)

LRB-P-B-1008 - The booster separation system can cause or be jeopardized by operator error during refurbishment of reusable components. -- This hazard is essentially the same as B-992. Handling of critical components must be controlled

by special handling instructions. (3 16 88)

LRB-P-B-1035 - The booster separation system can cause or be jeopardized by emergencies during inspection and test of the LRB and subsystems. -- This is the same hazard as B-1034. (3 16 88)

LRB-P-B-1037 - The booster separation system can cause or be jeopardized by emergencies during acceptance test and checkout prior to delivery to the Government. -- This is the same hazard as B-1034. (3 16 88)

LRB-P-B-1038 - The booster separation system can cause or be jeopardized by emergencies during test firing of engines and/or the completed booster. -- It is not anticipated that booster separation motors would be installed during test firing. If they are, this is the same hazard as B-760. (3 16 88)

LRB-P-B-1039 - The booster separation system can cause or be jeopardized by emergencies during flight readiness firing (FRF) of the STS vehicle. -- This is the same hazard as B-1034. The catastrophic event plan must include provisions for dealing effectively with a condition which could cause separation motor ignition as well as with the consequences of such ignition on the launch pad. See also B-895. (3 16 88)

LRB-P-B-1040 - The booster separation system can cause or be jeopardized by emergencies during preparation for shipment of the booster and ship loose hardware. -- This hazard is included in B-1034. (3 16 88)

LRB-P-B-1042 - The booster separation system can cause or be jeopardized by emergencies during storage, including storage of major components. -- This hazard is included under B-1034 (3 16 88)

LRB-P-B-1043 - The booster separation system can cause or be jeopardized by emergencies during preflight checkout prior to stacking. -- Existing emergency plans at the launch sites must be reviewed and updated to insure that they are adequate for handling of the LRB and its components. (3 16 88)

LRB-P-B-1044 - The booster separation system can cause or be jeopardized by emergencies during vehicle stacking, including ancillary test activities. -- The elements of this hazard have been included in previous analyses. (3 16 88)

LRB-P-B-1045 - The booster separation system can cause or be jeopardized by emergencies during rollout from the VAB and preloading preparation. -- This hazard is evaluated as B-901. (3 16 88)

LRB-P-B-1046 - The booster separation system can cause or be jeopardized by emergencies during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (3 16 88)

LRB-P-B-1047 - The booster separation system can cause or be jeopardized by emergencies during countdown to liftoff or abort. -- This hazard is evaluated as B-903. (3 16 88)

LRB-P-B-1048 - The booster separation system can cause or be jeopardized by emergencies during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (3 16 88)

LRB-P-B-1049 - The booster separation system can cause or be jeopardized by emergencies during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (3 16 88)

LRB-P-B-1050 - The booster separation system can cause or be jeopardized by emergencies during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (3 16 88)

LRB-P-B-1051 - The booster separation system can cause or be jeopardized by emergencies during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (3 16 88)

LRB-P-B-1056 - The booster separation system can cause or be jeopardized by emergencies during refurbishment of reusable components. -- This hazard is not credible. (3 16 88)

THESE HAZARDS WERE CONSIDERED BY THE ANALYST BUT WERE NOT FURTHER ANALYZED FOR THE REASONS GIVEN

LRB-P-C-566 - The flight crew can cause or be jeopardized by worker overload during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (3 17 88)

LRB-P-C-567 - The flight crew can cause or be jeopardized by worker overload during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (3 17 88)

LRB-P-C-568 - The flight crew can cause or be jeopardized by worker overload during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (3 17 88)

LRB-P-C-569 - The flight crew can cause or be jeopardized by worker overload during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (3 17 88)

LRB-P-C-571 - The flight crew can cause or be jeopardized by worker overload during separation of the LRB from the STS vehicle. -- This hazard is essentially the same as B-1001 (3 17 88)

LRB-P-C-591 - The flight crew can cause or be jeopardized by unsafe or unhygienic working conditions during countdown to liftoff or abort. -- This is essentially the same hazard as C-590. (3 17 88)

LRB-P-C-593 - The flight crew can cause or be jeopardized by unsafe or unhygienic working conditions during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (3 17 88)

LRB-P-C-594 - The flight crew can cause or be jeopardized by unsafe or unhygienic working conditions during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (3 17 88)

LRB-P-C-595 - The flight crew can cause or be jeopardized by unsafe or unhygienic working conditions during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (3 17 88)

LRB-P-C-806 - The flight crew can cause or be jeopardized by vibration, acoustic loads or shock during propellant loading for test or flight. -- This hazard is not credible. (3 17 88)

LRB-P-C-807 - The flight crew can cause or be jeopardized by vibration, acoustic loads or shock during countdown to liftoff or abort. -- This hazard is not credible. (3 17 88)

LRB-P-C-808 - The flight crew can cause or be jeopardized by vibration, acoustic loads or shock during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (3 17 88)

LRB-P-C-810 - The flight crew can cause or be jeopardized by vibration, acoustic loads or shock during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (3 17 88)

LRB-P-C-811 - The flight crew can cause or be jeopardized by vibration, acoustic loads or shock during separation of the LRB from the STS vehicle. -- This hazard is not credible. (3 17 88)

LRB-P-C-878 - The flight crew can cause or be jeopardized by propellant characteristics and products during propellant loading for test or flight. -- The baseline propellants at this time are LOX and RP-1, both of which are relatively innocuous. If other propellants are used, this hazard would require reevaluation. (3 17 88)

LRB-P-C-880 - The flight crew can cause or be jeopardized by propellant characteristics and products during launch abort activities, including mission postponement (scrub). -- This is essentially the same hazard as C-879. (3 17 88)

LRB-P-C-881 - The flight crew can cause or be jeopardized by propellant characteristics and products during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (3 17 88)

LRB-P-C-882 - The flight crew can cause or be jeopardized by propellant characteristics and products during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (3 17 88)

LRB-P-C-883 - The flight crew can cause or be jeopardized by propellant characteristics and products during separation of the LRB from the STS vehicle. -- This hazard is not credible. (3 17 88)

LRB-P-C-998 - The flight crew can cause or be jeopardized by operator error during propellant loading for test or flight. -- Although this hazard is credible, it is not specific to the crew alone. An operator error which would jeopardize the crew would also jeopardize the entire vehicle. Since the flight crew is not involved in loading the vehicle, it is not likely that they can be the source of danger. (3 17 88)

LRB-P-C-1000 - The flight crew can cause or be jeopardized by operator error during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (3 18 88)

LRB-P-C-1002 - The flight crew can cause or be jeopardized by operator error during intact abort, including RTLS, TAL, AOA and ATO. -- This is essentially the

same hazard as B-1001. (3 18 88)

LRB-P-C-1003 - The flight crew can cause or be jeopardized by operator error during separation of the LRB from the STS vehicle. -- This is essentially the same hazard as B-1001. (3 18 88)

LRB-P-C-1046 - The flight crew can cause or be jeopardized by emergencies during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (3 18 88)

LRB-P-C-1047 - The flight crew can cause or be jeopardized by emergencies during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (3 18 88)

LRB-P-C-1048 - The flight crew can cause or be jeopardized by emergencies during launch abort activities, including mission postponement (scrub). -- This hazard is evaluated as C-879. (3 18 88)

LRB-P-C-1049 - The flight crew can cause or be jeopardized by emergencies during nominal flight from liftoff to LRB burnout. -- This hazard is evaluated as B-1001. (3 18 88)

LRB-P-C-1050 - The flight crew can cause or be jeopardized by emergencies during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is evaluated as C-570. (3 18 88)

LRB-P-C-1051 - The flight crew can cause or be jeopardized by emergencies during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (3 18 88)

THESE HAZARDS WERE CONSIDERED BY THE ANALYST BUT WERE NOT FURTHER ANALYZED FOR THE REASONS GIVEN

LRB-P-D-529 - Parachutes and recovery aids can cause or be jeopardized by hazardous environments during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (3 18 88)

LRB-P-D-531 - Parachutes and recovery aids can cause or be jeopardized by hazardous environments during inspection and test of the LRB and subsystems. -- It is assumed that proper test equipment will be used to test pyrotechnic devices. Inspection and test of other subsystems is assumed to be done with appropriate equipment. (3 18 88)

LRB-P-D-532 - Parachutes and recovery aids can cause or be jeopardized by hazardous environments during proof test of pressure vessels and structure. -- This hazard is not credible. (3 18 88)

LRB-P-D-533 - Parachutes and recovery aids can cause or be jeopardized by hazardous environments during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (3 18 88)

LRB-P-D-534 - Parachutes and recovery aids can cause or be jeopardized by hazardous environments during test firing of engines and/or the completed booster. -- Recovery aids are not likely to be installed during test firing. (3 18 88)

LRB-P-D-537 - Parachutes and recovery aids can cause or be jeopardized by hazardous environments during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (3 18 88)

LRB-P-D-538 - Parachutes and recovery aids can cause or be jeopardized by hazardous environments during storage, including storage of major components. -- This is essentially the same hazard as D-530. (3 18 88)

LRB-P-D-539 - Parachutes and recovery aids can cause or be jeopardized by hazardous environments during preflight checkout prior to stacking. -- It is assumed appropriate checkout equipment will be used for preflight test and inspection. (3 18 88)

LRB-P-D-540 - Parachutes and recovery aids can cause or be jeopardized by hazardous environments during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (3 18 88)

LRB-P-D-541 - Parachutes and recovery aids can cause or be jeopardized by hazardous environments during rollout from the VAB and preloading preparation. --

At the current state of maturity, this hazard cannot be evaluated. (3 18 88)

LRB-P-D-542 - Parachutes and recovery aids can cause or be jeopardized by hazardous environments during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (3 18 88)

LRB-P-D-543 - Parachutes and recovery aids can cause or be jeopardized by hazardous environments during countdown to liftoff or abort. -- This hazard is not credible. (3 18 88)

LRB-P-D-544 - Parachutes and recovery aids can cause or be jeopardized by hazardous environments during launch abort activities, including mission postponement (scrub). -- This hazard is not credible. (3 18 88)

LRB-P-D-545 - Parachutes and recovery aids can cause or be jeopardized by hazardous environments during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (3 18 88)

LRB-P-D-546 - Parachutes and recovery aids can cause or be jeopardized by hazardous environments during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (3 18 88)

LRB-P-D-547 - Parachutes and recovery aids can cause or be jeopardized by hazardous environments during separation of the LRB from the STS vehicle. -- This hazard is not credible. (3 18 88)

LRB-P-D-548 - Parachutes and recovery aids can cause or be jeopardized by hazardous environments during descent from separation to ocean impact. -- The small impact footprint and short flight time of the LRB minimizes the probability of disposing of boosters in a hazardous area (e.g. a thunderstorm). (3 18 88)

LRB-P-D-549 - Parachutes and recovery aids can cause or be jeopardized by hazardous environments during splashdown events occuring at impact (disposable for expendables). -- This is the design condition, the parameters of which are assumed to be well defined. (3 18 88)

LRB-P-D-550 - Parachutes and recovery aids can cause or be jeopardized by hazardous environments during floatation (of recoverable boosters) until recovery. -- Boosters should be designed for this environment. (3 18 88)

LRB-P-D-551 - Parachutes and recovery aids can cause or be jeopardized by hazardous environments during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (3 18 88)

LRB-P-D-552 - Parachutes and recovery aids can cause or be jeopardized by

hazardous environments during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (3 18 88)

LRB-P-D-577 - Parachutes and recovery aids can cause or be jeopardized by unsafe or unhygienic working conditions during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (3 18 88)

LRB-P-D-578 - Parachutes and recovery aids can cause or be jeopardized by unsafe or unhygienic working conditions during manufacture and fabrication of subsystems and components. -- This is essentially the same hazard as D-530. (3 18 88)

LRB-P-D-579 - Parachutes and recovery aids can cause or be jeopardized by unsafe or unhygienic working conditions during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (3 18 88)

LRB-P-D-580 - Parachutes and recovery aids can cause or be jeopardized by unsafe or unhygienic working conditions during proof test of pressure vessels and structure. -- This hazard is not credible. (3 18 88)

LRB-P-D-581 - Parachutes and recovery aids can cause or be jeopardized by unsafe or unhygienic working conditions during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (3 18 88)

LRB-P-D-582 - Parachutes and recovery aids can cause or be jeopardized by unsafe or unhygienic working conditions during test firing of engines and/or the completed booster. -- This hazard is not credible. (3 18 88)

LRB-P-D-583 - Parachutes and recovery aids can cause or be jeopardized by unsafe or unhygienic working conditions during flight readiness firing (FRF) of the STS vehicle. -- This hazard is not credible. (3 18 88)

LRB-P-D-584 - Parachutes and recovery aids can cause or be jeopardized by unsafe or unhygienic working conditions during preparation for shipment of the booster and ship loose hardware. -- This hazard is not credible. (3 18 88)

LRB-P-D-585 - Parachutes and recovery aids can cause or be jeopardized by unsafe or unhygienic working conditions during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (3 18 88)

LRB-P-D-586 - Parachutes and recovery aids can cause or be jeopardized by unsafe or unhygienic working conditions during storage, including storage of major components. -- It is assumed that storage facilities will be designed for the hazards

associated with this subsystem. (3 18 88)

LRB-P-D-587 - Parachutes and recovery aids can cause or be jeopardized by unsafe or unhygienic working conditions during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (3 18 88)

LRB-P-D-588 - Parachutes and recovery aids can cause or be jeopardized by unsafe or unhygienic working conditions during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (3 18 88)

LRB-P-D-589 - Parachutes and recovery aids can cause or be jeopardized by unsafe or unhygienic working conditions during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (3 18 88)

LRB-P-D-590 - Parachutes and recovery aids can cause or be jeopardized by unsafe or unhygienic working conditions during propellant loading for test or flight. -- This hazard is not credible. (3 18 88)

LRB-P-D-591 - Parachutes and recovery aids can cause or be jeopardized by unsafe or unhygienic working conditions during countdown to liftoff or abort. -- This hazard is not credible. (3 18 88)

LRB-P-D-592 - Parachutes and recovery aids can cause or be jeopardized by unsafe or unhygienic working conditions during launch abort activities, including mission postponement (scrub). -- This hazard is not credible. (3 18 88)

LRB-P-D-593 - Parachutes and recovery aids can cause or be jeopardized by unsafe or unhygienic working conditions during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (3 18 88)

LRB-P-D-594 - Parachutes and recovery aids can cause or be jeopardized by unsafe or unhygienic working conditions during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (3 18 88)

LRB-P-D-595 - Parachutes and recovery aids can cause or be jeopardized by unsafe or unhygienic working conditions during separation of the LRB from the STS vehicle. -- All hazards associated with this condition would be due to component failure. (3 18 88)

LRB-P-D-596 - Parachutes and recovery aids can cause or be jeopardized by unsafe or unhygienic working conditions during descent from separation to ocean impact. -- This hazard is not credible. (3 18 88)

LRB-P-D-597 - Parachutes and recovery aids can cause or be jeopardized by

unsafe or unhygienic working conditions during splashdown events occuring at impact (disposable for expendables). -- The precise time and location of the impact footprint makes it extremely unlikely that a ship or aircraft would be damaged by a descending booster. (3 18 88)

LRB-P-D-598 - Parachutes and recovery aids can cause or be jeopardized by unsafe or unhygienic working conditions during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (3 18 88)

LRB-P-D-600 - Parachutes and recovery aids can cause or be jeopardized by unsafe or unhygienic working conditions during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (3 18 88)

LRB-P-D-625 - Parachutes and recovery aids can cause or be jeopardized by wind during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (3 18 88)

LRB-P-D-626 - Parachutes and recovery aids can cause or be jeopardized by wind during manufacture and fabrication of subsystems and components. -- This hazard is not credible. (3 18 88)

LRB-P-D-627 - Parachutes and recovery aids can cause or be jeopardized by wind during inspection and test of the LRB and subsystems. -- Testing of parachutes and other recovery aids will likely include a functional test involving actual release and descent of a dummy load. High winds could cause the load to drift or be dragged along the ground. Although this is a credible hazard, it does not appear at this time to require the detailed analysis characteristic of a hazard analysis. Information from Pioneer Systems indicates that the 48,000 pound booster load is to heavy to drift. (4 7 88)

LRB-P-D-628 - Parachutes and recovery aids can cause or be jeopardized by wind during proof test of pressure vessels and structure. -- This hazard is not credible. (3 18 88)

LRB-P-D-629 - Parachutes and recovery aids can cause or be jeopardized by wind during acceptance test and checkout prior to delivery to the Government. -- Acceptance tests are not likely to include functional operation of the recovery system. Therefore, this hazard does not appear to be credible. (3 18 88)

LRB-P-D-630 - Parachutes and recovery aids can cause or be jeopardized by wind during test firing of engines and/or the completed booster. -- This hazard is not credible. (3 18 88)

LRB-P-D-631 - Parachutes and recovery aids can cause or be jeopardized by wind

during flight readiness firing (FRF) of the STS vehicle. -- This hazard is not credible. (3 18 88)

LRB-P-D-632 - Parachutes and recovery aids can cause or be jeopardized by wind during preparation for shipment of the booster and ship loose hardware. -- This hazard is not credible. (3 18 88)

LRB-P-D-633 - Parachutes and recovery aids can cause or be jeopardized by wind during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (3 18 88)

LRB-P-D-634 - Parachutes and recovery aids can cause or be jeopardized by wind during storage, including storage of major components. -- This hazard is not credible. (3 18 88)

LRB-P-D-635 - Parachutes and recovery aids can cause or be jeopardized by wind during preflight checkout prior to stacking. -- This hazard is not credible. (3 18 88)

LRB-P-D-636 - Parachutes and recovery aids can cause or be jeopardized by wind during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (3 18 88)

LRB-P-D-637 - Parachutes and recovery aids can cause or be jeopardized by wind during rollout from the VAB and preloading preparation. -- This hazard is not credible. (3 18 88)

LRB-P-D-638 - Parachutes and recovery aids can cause or be jeopardized by wind during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (3 18 88)

LRB-P-D-639 - Parachutes and recovery aids can cause or be jeopardized by wind during countdown to liftoff or abort. -- This hazard is not credible. (3 18 88)

LRB-P-D-640 - Parachutes and recovery aids can cause or be jeopardized by wind during launch abort activities, including mission postponement (scrub). -- This hazard is not credible. (3 18 88)

LRB-P-D-641 - Parachutes and recovery aids can cause or be jeopardized by wind during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (3 18 88)

LRB-P-D-642 - Parachutes and recovery aids can cause or be jeopardized by wind during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (3 18 88)

LRB-P-D-643 - Parachutes and recovery aids can cause or be jeopardized by wind

during separation of the LRB from the STS vehicle. -- This hazard is not credible. (3 18 88)

LRB-P-D-648 - Parachutes and recovery aids can cause or be jeopardized by wind during refurbishment of reusable components. -- This hazard is not credible. (3 18 88)

LRB-P-D-673 - Parachutes and recovery aids can cause or be jeopardized by heat sources during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (3 18 88)

LRB-P-D-674 - Parachutes and recovery aids can cause or be jeopardized by heat sources during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (3 18 88)

LRB-P-D-675 - Parachutes and recovery aids can cause or be jeopardized by heat sources during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (3 18 88)

LRB-P-D-676 - Parachutes and recovery aids can cause or be jeopardized by heat sources during proof test of pressure vessels and structure. -- This hazard is not credible. (3 18 88)

LRB-P-D-677 - Parachutes and recovery aids can cause or be jeopardized by heat sources during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (3 18 88)

LRB-P-D-678 - Parachutes and recovery aids can cause or be jeopardized by heat sources during test firing of engines and/or the completed booster. -- Recovery aids are not likely to be installed during test firing except for FRF. It may be possible to use a dummy parachute pack during this time. (4 7 88)

LRB-P-D-680 - Parachutes and recovery aids can cause or be jeopardized by heat sources during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (3 18 88)

LRB-P-D-682 - Parachutes and recovery aids can cause or be jeopardized by heat sources during storage, including storage of major components. -- It is assumed that storage conditions will not impose excessive heat loads. (3 18 88)

LRB-P-D-683 - Parachutes and recovery aids can cause or be jeopardized by heat sources during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (3 18 88)

LRB-P-D-684 - Parachutes and recovery aids can cause or be jeopardized by heat sources during vehicle stacking, including ancillary test activities. -- At the current

state of maturity, this hazard cannot be evaluated. (3 18 88)

LRB-P-D-685 - Parachutes and recovery aids can cause or be jeopardized by heat sources during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (3 18 88)

LRB-P-D-687 - Parachutes and recovery aids can cause or be jeopardized by heat sources during countdown to liftoff or abort. -- This is essentially the same hazard as D-686; similar considerations apply. (3 18 88)

LRB-P-D-688 - Parachutes and recovery aids can cause or be jeopardized by heat sources during launch abort activities, including mission postponement (scrub). -- Excessive postignition firing before shutdown will constitute the same hazard as D-679. (3 18 88)

LRB-P-D-690 - Parachutes and recovery aids can cause or be jeopardized by heat sources during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (3 18 88)

LRB-P-D-692 - Parachutes and recovery aids can cause or be jeopardized by heat sources during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (3 18 88)

LRB-P-D-693 - Parachutes and recovery aids can cause or be jeopardized by heat sources during splashdown events occuring at impact (disposable for expendables). -- Attention should be given to the rapid contraction of hot components, possibly heated by the separation motors or ullage gas, when suddenly immersed in seawater. (3 18 88)

LRB-P-D-694 - Parachutes and recovery aids can cause or be jeopardized by heat sources during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (3 18 88)

LRB-P-D-695 - Parachutes and recovery aids can cause or be jeopardized by heat sources during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (3 21 88)

LRB-P-D-696 - Parachutes and recovery aids can cause or be jeopardized by heat sources during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (3 21 88)

LRB-P-D-697 - Parachutes and recovery aids can cause or be jeopardized by radiation or sunlight during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (3 21 88)

LRB-P-D-698 - Parachutes and recovery aids can cause or be jeopardized by

radiation or sunlight during manufacture and fabrication of subsystems and components. -- This hazard is not credible. (3 21 88)

LRB-P-D-699 - Parachutes and recovery aids can cause or be jeopardized by radiation or sunlight during inspection and test of the LRB and subsystems. -- Although there is a possibility that pyrotechnics could be ignited by stray currents during test, it is assumed that safety precautions taken to protect these systems will be sufficient. (3 21 88)

LRB-P-D-700 - Parachutes and recovery aids can cause or be jeopardized by radiation or sunlight during proof test of pressure vessels and structure. -- This hazard is not credible. (3 21 88)

LRB-P-D-701 - Parachutes and recovery aids can cause or be jeopardized by radiation or sunlight during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (3 21 88)

LRB-P-D-702 - Parachutes and recovery aids can cause or be jeopardized by radiation or sunlight during test firing of engines and/or the completed booster. -- This hazard is not credible. (3 21 88)

LRB-P-D-703 - Parachutes and recovery aids can cause or be jeopardized by radiation or sunlight during flight readiness firing (FRF) of the STS vehicle. -- This hazard is not credible. (3 21 88)

LRB-P-D-704 - Parachutes and recovery aids can cause or be jeopardized by radiation or sunlight during preparation for shipment of the booster and ship loose hardware. -- This hazard is not credible. (3 21 88)

LRB-P-D-705 - Parachutes and recovery aids can cause or be jeopardized by radiation or sunlight during transportation from manufacture to launch site or after recovery. -- This hazard is evaluated as D-681. (3 21 88)

LRB-P-D-706 - Parachutes and recovery aids can cause or be jeopardized by radiation or sunlight during storage, including storage of major components. -- It is assumed that storage conditions will be sufficient to protect the booster from any adverse effects from radiation. (3 21 88)

LRB-P-D-707 - Parachutes and recovery aids can cause or be jeopardized by radiation or sunlight during preflight checkout prior to stacking. -- The main problem here seems to be the possibility of accidental initiation of pyrotechnic devices by electromagnetic energy from radio transmitters. It is assumed that safety precautions will be sufficient to prevent this occurrence. (3 21 88)

LRB-P-D-708 - Parachutes and recovery aids can cause or be jeopardized by radiation or sunlight during vehicle stacking, including ancillary test activities. -- This

hazard is not credible. (3 21 88)

LRB-P-D-709 - Parachutes and recovery aids can cause or be jeopardized by radiation or sunlight during rollout from the VAB and preloading preparation. -- The hazard here appears to be electromagnetic radiation from lightning, since the LRB is most vulnerable during this time. This hazard is addressed under lightning. (3 21 88)

LRB-P-D-710 - Parachutes and recovery aids can cause or be jeopardized by radiation or sunlight during propellant loading for test or flight. -- This hazard is not credible. (3 21 88)

LRB-P-D-711 - Parachutes and recovery aids can cause or be jeopardized by radiation or sunlight during countdown to liftoff or abort. -- This hazard is not credible. (3 21 88)

LRB-P-D-712 - Parachutes and recovery aids can cause or be jeopardized by radiation or sunlight during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (3 21 88)

LRB-P-D-713 - Parachutes and recovery aids can cause or be jeopardized by radiation or sunlight during nominal flight from liftoff to LRB burnout. -- The problem here appears to be thermal radiation, which is treated under HAW D-689. (3 21 88)

LRB-P-D-714 - Parachutes and recovery aids can cause or be jeopardized by radiation or sunlight during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (3 21 88)

LRB-P-D-715 - Parachutes and recovery aids can cause or be jeopardized by radiation or sunlight during separation of the LRB from the STS vehicle. -- This hazard is not credible. (3 21 88)

LRB-P-D-716 - Parachutes and recovery aids can cause or be jeopardized by radiation or sunlight during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (3 21 88)

LRB-P-D-717 - Parachutes and recovery aids can cause or be jeopardized by radiation or sunlight during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (3 21 88)

LRB-P-D-719 - Parachutes and recovery aids can cause or be jeopardized by radiation or sunlight during recovery activities, including towing, and retrieval of recoverables. -- This is essentially the same hazard as D-718; similar considerations apply. Current plan is to cut parachutes loose to sink. (3 21 88)

LRB-P-D-720 - Parachutes and recovery aids can cause or be jeopardized by

radiation or sunlight during refurbishment of reusable components. -- This hazard is not credible. (3 21 88)

LRB-P-D-745 - Parachutes and recovery aids can cause or be jeopardized by electrical system malfunction during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (3 21 88)

LRB-P-D-746 - Parachutes and recovery aids can cause or be jeopardized by electrical system malfunction during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (3 21 88)

LRB-P-D-748 - Parachutes and recovery aids can cause or be jeopardized by electrical system malfunction during proof test of pressure vessels and structure. -- This hazard is not credible. (3 21 88)

LRB-P-D-749 - Parachutes and recovery aids can cause or be jeopardized by electrical system malfunction during acceptance test and checkout prior to delivery to the Government. -- Acceptance test is generally a visual inspection and record check. It is not likely that the boosters could be jeopardized during this time. (3 21 88)

LRB-P-D-750 - Parachutes and recovery aids can cause or be jeopardized by electrical system malfunction during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. Two check lines can be used to check that the cutters have not been fired. (4 7 88)

LRB-P-D-751 - Parachutes and recovery aids can cause or be jeopardized by electrical system malfunction during flight readiness firing (FRF) of the STS vehicle. -- This hazard is essentially the same as D-760. (3 21 88)

LRB-P-D-752 - Parachutes and recovery aids can cause or be jeopardized by electrical system malfunction during preparation for shipment of the booster and ship loose hardware. -- This hazard can exist if pyrotechnic initiation circuits are not properly protected. It is assumed that such protection will be provided. Two check lines can be used to check that the cutters have not been fired. (4 7 88)

LRB-P-D-753 - Parachutes and recovery aids can cause or be jeopardized by electrical system malfunction during transportation from manufacture to launch site or after recovery. -- This is essentially the same hazard as D-752. (3 21 88)

LRB-P-D-754 - Parachutes and recovery aids can cause or be jeopardized by electrical system malfunction during storage, including storage of major components. -- It is assumed that storage conditions will be adequate to protect the vehicle from stray currents which could initiate pyrotechnics. (3 21 88)

LRB-P-D-755 - Parachutes and recovery aids can cause or be jeopardized by

electrical system malfunction during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (3 21 88)

LRB-P-D-756 - Parachutes and recovery aids can cause or be jeopardized by electrical system malfunction during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (3 21 88)

LRB-P-D-757 - Parachutes and recovery aids can cause or be jeopardized by electrical system malfunction during rollout from the VAB and preloading preparation. -- This hazard has to do with initiation of pyrotechnics by lightning or stray electromagnetic radiation which is treated in previous hazard analyses. (3 21 88)

LRB-P-D-758 - Parachutes and recovery aids can cause or be jeopardized by electrical system malfunction during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (3 21 88)

LRB-P-D-759 - Parachutes and recovery aids can cause or be jeopardized by electrical system malfunction during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (3 21 88)

LRB-P-D-761 - Parachutes and recovery aids can cause or be jeopardized by electrical system malfunction during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (3 21 88)

LRB-P-D-763 - Parachutes and recovery aids can cause or be jeopardized by electrical system malfunction during separation of the LRB from the STS vehicle. -- Routine sneak circuit analysis should preclude inadvertent deployment of recovery devices during separation. (3 21 88)

LRB-P-D-764 - Parachutes and recovery aids can cause or be jeopardized by electrical system malfunction during descent from separation to ocean impact. -- It is obvious that a malfunction of the electronics driving the deployment of parachutes or other recovery devices would emperil the booster during the time that these devices are required to operate. However, this problem is properly the subject of a failure modes and effects analysis (FMEA), which is premature at this level of maturity. (3 21 88)

LRB-P-D-765 - Parachutes and recovery aids can cause or be jeopardized by electrical system malfunction during splashdown events occuring at impact (disposable for expendables). -- This is essentially a FMEA item and cannot be evaluated at the current state of design maturity. (3 21 88)

LRB-P-D-766 - Parachutes and recovery aids can cause or be jeopardized by electrical system malfunction during floatation (of recoverable boosters) until recovery. -- Recoverable boosters will likely have optical, radio and acoustic location

aids. Malfunction of these devices due to electrical malfunction would jeopardize recovery. However, at the current state of maturity, this hazard cannot be evaluated. (3 21 88)

LRB-P-D-767 - Parachutes and recovery aids can cause or be jeopardized by electrical system malfunction during recovery activities, including towing, and retrieval of recoverables. -- It is likely that any operational systems on the booster at this time would be driven by shipboard power and control. (3 21 88)

LRB-P-D-768 - Parachutes and recovery aids can cause or be jeopardized by electrical system malfunction during refurbishment of reusable components. -- This hazard is not credible. (3 21 88)

LRB-P-D-889 - Parachutes and recovery aids can cause or be jeopardized by lightning or electromagnetic discharge during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (3 21 88)

LRB-P-D-890 - Parachutes and recovery aids can cause or be jeopardized by lightning or electromagnetic discharge during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (3 21 88)

LRB-P-D-892 - Parachutes and recovery aids can cause or be jeopardized by lightning or electromagnetic discharge during proof test of pressure vessels and structure. -- This hazard is not credible. (3 22 88)

LRB-P-D-893 - Parachutes and recovery aids can cause or be jeopardized by lightning or electromagnetic discharge during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (3 22 88)

LRB-P-D-895 - Parachutes and recovery aids can cause or be jeopardized by lightning or electromagnetic discharge during flight readiness firing (FRF) of the STS vehicle. -- This is essentially the same hazard as D-894; similar considerations apply. (3 22 88)

LRB-P-D-896 - Parachutes and recovery aids can cause or be jeopardized by lightning or electromagnetic discharge during preparation for shipment of the booster and ship loose hardware. -- It is assumed that boosters will be protected from lightning except when other protection is afforded. See D-536. Current plan is for the parachute pack to be installed at KSC. (4 7 88)

LRB-P-D-897 - Parachutes and recovery aids can cause or be jeopardized by lightning or electromagnetic discharge during transportation from manufacture to launch site or after recovery. -- It is assumed that boosters will be protected from lightning during this time. Also, the current plan is for parachutes to be used only once. (4 7 88)

LRB-P-D-898 - Parachutes and recovery aids can cause or be jeopardized by lightning or electromagnetic discharge during storage, including storage of major components. -- It is assumed that completed boosters will be stored in an environment in which they are protected from lightning strike. (3 22 88)

LRB-P-D-899 - Parachutes and recovery aids can cause or be jeopardized by lightning or electromagnetic discharge during preflight checkout prior to stacking. -- This hazard is not credible. (3 22 88)

LRB-P-D-900 - Parachutes and recovery aids can cause or be jeopardized by lightning or electromagnetic discharge during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (3 22 88)

LRB-P-D-901 - Parachutes and recovery aids can cause or be jeopardized by lightning or electromagnetic discharge during rollout from the VAB and preloading preparation. -- This hazard is closely associated with B-901. Inasmuch as the parachute pyrotechnics are more protected than the separation motors (which are located next to fairing penetrations), protection which is adequate for the booster separation motor pyrotechnics is assumed to be sufficient for the deployment pyrotechnics as well. (3 22 88)

LRB-P-D-902 - Parachutes and recovery aids can cause or be jeopardized by lightning or electromagnetic discharge during propellant loading for test or flight. -- There is nothing about propellant loading by itself, which would increase the vulnerability of the parachutes and other recovery aids to the damaging effects of lightning. (3 22 88)

LRB-P-D-903 - Parachutes and recovery aids can cause or be jeopardized by lightning or electromagnetic discharge during countdown to liftoff or abort. -- This hazard is closely associated with B-903. Design features which protect the separation system from possible damage from lightning strike are assumed at this time to be adequate for the parachute deployment pyrotechnics as well. (3 22 88)

LRB-P-D-904 - Parachutes and recovery aids can cause or be jeopardized by lightning or electromagnetic discharge during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-905 - Parachutes and recovery aids can cause or be jeopardized by lightning or electromagnetic discharge during nominal flight from liftoff to LRB burnout. -- All LRB systems will be designed to withstand lightning strike during flight. (3 22 88)

LRB-P-D-906 - Parachutes and recovery aids can cause or be jeopardized by lightning or electromagnetic discharge during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-907 - Parachutes and recovery aids can cause or be jeopardized by lightning or electromagnetic discharge during separation of the LRB from the STS vehicle. -- At separation altitude, lightning strike is not considered to be a significant problem. (3 22 88)

LRB-P-D-909 - Parachutes and recovery aids can cause or be jeopardized by lightning or electromagnetic discharge during splashdown events occuring at impact (disposable for expendables). -- This hazard is closely associated with D-908. It is assumed to be less severe because of the short time interval involved, and the low probability of lightning strike on the booster due to the proximity of seawater which is at the same potential as the booster. (3 22 88)

LRB-P-D-910 - Parachutes and recovery aids can cause or be jeopardized by lightning or electromagnetic discharge during floatation (of recoverable boosters) until recovery. -- This hazard is closely associated with D-909. It is assumed to be less severe because recovery aid deployment systems (and possibly parachute suspension system disconnection systems) will already have been activated. (3 22 88)

LRB-P-D-911 - Parachutes and recovery aids can cause or be jeopardized by lightning or electromagnetic discharge during recovery activities, including towing, and retrieval of recoverables. -- The current recovery scenario is for parachutes to be cut loose to sink. (4 7 88)

LRB-P-D-912 - Parachutes and recovery aids can cause or be jeopardized by lightning or electromagnetic discharge during refurbishment of reusable components. -- This hazard is not credible. (3 22 88)

LRB-P-D-961 - Parachutes and recovery aids can cause or be jeopardized by computer system malfunction during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (3 22 88)

LRB-P-D-962 - Parachutes and recovery aids can cause or be jeopardized by computer system malfunction during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-964 - Parachutes and recovery aids can cause or be jeopardized by computer system malfunction during proof test of pressure vessels and structure. -- This hazard is not credible. (3 22 88)

LRB-P-D-965 - Parachutes and recovery aids can cause or be jeopardized by computer system malfunction during acceptance test and checkout prior to delivery to the Government. -- Acceptance tests are usually visual walkdown inspections and documentation verification. These are not likely to cause hazards. (3 22 88)

LRB-P-D-966 - Parachutes and recovery aids can cause or be jeopardized by computer system malfunction during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-967 - Parachutes and recovery aids can cause or be jeopardized by computer system malfunction during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-968 - Parachutes and recovery aids can cause or be jeopardized by computer system malfunction during preparation for shipment of the booster and ship loose hardware. -- This hazard is not credible. (3 22 88)

LRB-P-D-969 - Parachutes and recovery aids can cause or be jeopardized by computer system malfunction during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (3 22 88)

LRB-P-D-970 - Parachutes and recovery aids can cause or be jeopardized by computer system malfunction during storage, including storage of major components. -- This hazard is not credible. (3 22 88)

LRB-P-D-971 - Parachutes and recovery aids can cause or be jeopardized by computer system malfunction during preflight checkout prior to stacking. -- This hazard is essentially the same as D-963; similar considerations apply. (3 22 88)

LRB-P-D-972 - Parachutes and recovery aids can cause or be jeopardized by computer system malfunction during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-973 - Parachutes and recovery aids can cause or be jeopardized by computer system malfunction during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-974 - Parachutes and recovery aids can cause or be jeopardized by computer system malfunction during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-975 - Parachutes and recovery aids can cause or be jeopardized by computer system malfunction during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-976 - Parachutes and recovery aids can cause or be jeopardized by computer system malfunction during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed in conjunction with D-760. (3 22 88)

LRB-P-D-977 - Parachutes and recovery aids can cause or be jeopardized by computer system malfunction during nominal flight from liftoff to LRB burnout. -- This is the design condition. Hazards during this time period are associated with equipment failure, which is to be analyzed by a FMEA. (3 22 88)

LRB-P-D-978 - Parachutes and recovery aids can cause or be jeopardized by computer system malfunction during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is analyzed in conjunction with D-762. (3 22 88)

LRB-P-D-979 - Parachutes and recovery aids can cause or be jeopardized by computer system malfunction during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-980 - Parachutes and recovery aids can cause or be jeopardized by computer system malfunction during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-981 - Parachutes and recovery aids can cause or be jeopardized by computer system malfunction during splashdown events occuring at impact (disposable for expendables). -- It is likely that a microcomputer will operate recovery aids, but hazards associated with this system cannot be evaluated at this time. (3 22 88)

LRB-P-D-982 - Parachutes and recovery aids can cause or be jeopardized by computer system malfunction during floatation (of recoverable boosters) until recovery. -- This hazard is closely associated with D-981. At present, it is not considered likely that computer-operated equipment will be used during recovery. (4 7 88)

LRB-P-D-983 - Parachutes and recovery aids can cause or be jeopardized by computer system malfunction during recovery activities, including towing, and retrieval of recoverables. -- It is not likely that recovery activities will include computer-operated equipment. (4 7 88)

LRB-P-D-984 - Parachutes and recovery aids can cause or be jeopardized by computer system malfunction during refurbishment of reusable components. -- This hazard is not credible. (3 22 88)

LRB-P-D-985 - Parachutes and recovery aids can cause or be jeopardized by operator error during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (3 22 88)

LRB-P-D-986 - Parachutes and recovery aids can cause or be jeopardized by operator error during manufacture and fabrication of subsystems and components. -- This hazard is evaluated as D-530. (3 22 88)

LRB-P-D-987 - Parachutes and recovery aids can cause or be jeopardized by operator error during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-988 - Parachutes and recovery aids can cause or be jeopardized by operator error during proof test of pressure vessels and structure. -- This hazard is not credible. (3 22 88)

LRB-P-D-989 - Parachutes and recovery aids can cause or be jeopardized by operator error during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (3 22 88)

LRB-P-D-990 - Parachutes and recovery aids can cause or be jeopardized by operator error during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-991 - Parachutes and recovery aids can cause or be jeopardized by operator error during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-992 - Parachutes and recovery aids can cause or be jeopardized by operator error during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-993 - Parachutes and recovery aids can cause or be jeopardized by operator error during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-994 - Parachutes and recovery aids can cause or be jeopardized by operator error during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-995 - Parachutes and recovery aids can cause or be jeopardized by operator error during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-996 - Parachutes and recovery aids can cause or be jeopardized by operator error during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-997 - Parachutes and recovery aids can cause or be jeopardized by operator error during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-998 - Parachutes and recovery aids can cause or be jeopardized by

operator error during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-999 - Parachutes and recovery aids can cause or be jeopardized by operator error during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-1000 - Parachutes and recovery aids can cause or be jeopardized by operator error during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-1001 - Parachutes and recovery aids can cause or be jeopardized by operator error during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-1002 - Parachutes and recovery aids can cause or be jeopardized by operator error during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-1003 - Parachutes and recovery aids can cause or be jeopardized by operator error during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-1004 - Parachutes and recovery aids can cause or be jeopardized by operator error during descent from separation to ocean impact. -- This hazard is not credible. (3 22 88)

LRB-P-D-1005 - Parachutes and recovery aids can cause or be jeopardized by operator error during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (3 22 88)

LRB-P-D-1006 - Parachutes and recovery aids can cause or be jeopardized by operator error during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (3 22 88)

LRB-P-D-1007 - Parachutes and recovery aids can cause or be jeopardized by operator error during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-1008 - Parachutes and recovery aids can cause or be jeopardized by operator error during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-1033 - Parachutes and recovery aids can cause or be jeopardized by emergencies during component or material purchase, including acquisition of GFP. --

Hazards associated with transfer of control of pyrotechnic devices are analyzed in B-1033. This hazard is similar. (3 22 88)

LRB-P-D-1034 - Parachutes and recovery aids can cause or be jeopardized by emergencies during manufacture and fabrication of subsystems and components. -- Hazards associated with packing and storage of parachutes and protection of location and recovery aids have been satisfactorily dealt with in the case of the SRBs. It is assumed that satisfactory levels of safety can be achieved by a thorough review of procedures and practices, based on experience with previous successful systems. (3 22 88)

LRB-P-D-1035 - Parachutes and recovery aids can cause or be jeopardized by emergencies during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-1036 - Parachutes and recovery aids can cause or be jeopardized by emergencies during proof test of pressure vessels and structure. -- This hazard is not credible. (3 22 88)

LRB-P-D-1037 - Parachutes and recovery aids can cause or be jeopardized by emergencies during acceptance test and checkout prior to delivery to the Government. -- The event which transfers responsibility for protection of the booster to the Government should be precisely defined so that there will be no division of responsibility for protection of pyrotechnic devices. (3 22 88)

LRB-P-D-1038 - Parachutes and recovery aids can cause or be jeopardized by emergencies during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-1039 - Parachutes and recovery aids can cause or be jeopardized by emergencies during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-1040 - Parachutes and recovery aids can cause or be jeopardized by emergencies during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-1041 - Parachutes and recovery aids can cause or be jeopardized by emergencies during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-1042 - Parachutes and recovery aids can cause or be jeopardized by emergencies during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-1043 - Parachutes and recovery aids can cause or be jeopardized by emergencies during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-1044 - Parachutes and recovery aids can cause or be jeopardized by emergencies during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-1045 - Parachutes and recovery aids can cause or be jeopardized by emergencies during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-1046 - Parachutes and recovery aids can cause or be jeopardized by emergencies during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-1047 - Parachutes and recovery aids can cause or be jeopardized by emergencies during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-1048 - Parachutes and recovery aids can cause or be jeopardized by emergencies during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-1049 - Parachutes and recovery aids can cause or be jeopardized by emergencies during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-1050 - Parachutes and recovery aids can cause or be jeopardized by emergencies during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-1051 - Parachutes and recovery aids can cause or be jeopardized by emergencies during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-1052 - Parachutes and recovery aids can cause or be jeopardized by emergencies during descent from separation to ocean impact. -- Failure of parachutes to open should be evaluated by FMEA. The cluster system allows successful recovery with a partial failure. (4 7 88)

LRB-P-D-1053 - Parachutes and recovery aids can cause or be jeopardized by emergencies during splashdown events occuring at impact (disposable for expendables). -- Failure of recovery aids to deploy should be analyzed by FMEA. (3 22 88)

LRB-P-D-1054 - Parachutes and recovery aids can cause or be jeopardized by emergencies during floatation (of recoverable boosters) until recovery. -- Failure of location and recovery aids should be analyzed by FMEA. (3 22 88)

LRB-P-D-1055 - Parachutes and recovery aids can cause or be jeopardized by emergencies during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-D-1056 - Parachutes and recovery aids can cause or be jeopardized by emergencies during refurbishment of reusable components. -- Parachutes are not planned to be recoverable. (4 7 88)

THESE HAZARDS WERE CONSIDERED BY THE ANALYST BUT WERE NOT FURTHER ANALYZED FOR THE REASONS GIVEN

LRB-P-E-529 - The electrical system, batteries or APU can cause or be jeopardized by hazardous environments during component or material purchase, including acquisition of GFP. -- If thermal batteries are employed in the LRB, their use and storage will have to be examined for hazards associated with pyrotechnics. In such a case, this hazard may be associated with E-1033. (3 22 88)

LRB-P-E-530 - The electrical system, batteries or APU can cause or be jeopardized by hazardous environments during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-E-533 - The electrical system, batteries or APU can cause or be jeopardized by hazardous environments during acceptance test and checkout prior to delivery to the Government. -- Since acceptance tests are generally walkdown inspections and document inspection, this is not likely to be a credible hazard. (3 22 88)

LRB-P-E-534 - The electrical system, batteries or APU can cause or be jeopardized by hazardous environments during test firing of engines and/or the completed booster. -- Electrical power for booster systems being tested during other than FRF is likely to be supplied by the facility. If this is not the case, this hazard will require reexamining. (3 22 88)

LRB-P-E-535 - The electrical system, batteries or APU can cause or be jeopardized by hazardous environments during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-E-536 - The electrical system, batteries or APU can cause or be jeopardized by hazardous environments during preparation for shipment of the booster and ship loose hardware. -- It is assumed that batteries will be shipped separately. Therefore, this hazard is not assumed to apply. (3 22 88)

LRB-P-E-537 - The electrical system, batteries or APU can cause or be jeopardized by hazardous environments during transportation from manufacture to launch site or after recovery. -- It may be necessary to follow special procedures for shipping batteries to avoid the possibility of injury or environmental pollution if an accident occurs. At this time, it is not possible to more accurately analyze this hazard. (3 22 88)

LRB-P-E-538 - The electrical system, batteries or APU can cause or be jeopardized by hazardous environments during storage, including storage of major components. -- It is assumed that storage environments for batteries or other electrical components will be suitable for the materials stored. (3 22 88)

LRB-P-E-539 - The electrical system, batteries or APU can cause or be jeopardized by hazardous environments during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-E-540 - The electrical system, batteries or APU can cause or be jeopardized by hazardous environments during vehicle stacking, including ancillary test activities. -- This hazard is associated with E-531; similar considerations apply. (3 22 88)

LRB-P-E-541 - The electrical system, batteries or APU can cause or be jeopardized by hazardous environments during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-E-543 - The electrical system, batteries or APU can cause or be jeopardized by hazardous environments during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-E-544 - The electrical system, batteries or APU can cause or be jeopardized by hazardous environments during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (3 22 88)

LRB-P-E-545 - The electrical system, batteries or APU can cause or be jeopardized by hazardous environments during nominal flight from liftoff to LRB burnout. -- This is the design condition; therefore it is assumed maximum attention will be given to designing safety and reliability into the electrical system for this period of time. (3 22 88)

LRB-P-E-546 - The electrical system, batteries or APU can cause or be jeopardized by hazardous environments during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-547 - The electrical system, batteries or APU can cause or be jeopardized by hazardous environments during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-548 - The electrical system, batteries or APU can cause or be jeopardized by hazardous environments during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-549 - The electrical system, batteries or APU can cause or be jeopardized by hazardous environments during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-550 - The electrical system, batteries or APU can cause or be jeopardized by hazardous environments during floatation (of recoverable boosters) until recovery.

-- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-551 - The electrical system, batteries or APU can cause or be jeopardized by hazardous environments during recovery activities, including towing, and retrieval of recoverables. -- It is assumed that provisions will be incorporated in the design to safe the electrical system to prevent shock due to accidental contact with live circuits. (3 23 88)

LRB-P-E-552 - The electrical system, batteries or APU can cause or be jeopardized by hazardous environments during refurbishment of reusable components. -- It is assumed that precautions will be taken to prevent damage to the electrical system or inadvertent contact with voltage sources during refurbishment. (3 23 88)

LRB-P-E-649 - The electrical system, batteries or APU can cause or be jeopardized by contamination during component or material purchase, including acquisition of GFP. -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-650 - The electrical system, batteries or APU can cause or be jeopardized by contamination during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-651 - The electrical system, batteries or APU can cause or be jeopardized by contamination during inspection and test of the LRB and subsystems. -- Testing may include a functional test of electrical generators (if any). The fuel used has the potential for clogging filters or introducing contamination if the fuel itself is contaminated. It is assumed that proper standards of quality control will be established for test fuels as well as flight fuels. (3 23 88)

LRB-P-E-653 - The electrical system, batteries or APU can cause or be jeopardized by contamination during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (3 23 88)

LRB-P-E-654 - The electrical system, batteries or APU can cause or be jeopardized by contamination during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-655 - The electrical system, batteries or APU can cause or be jeopardized by contamination during flight readiness firing (FRF) of the STS vehicle. -- It is assumed that the configuration of the battery vents (if any) will be such that exhaust gasses from tested rocket motors will not have the potential for being ingested into and/or causing contamination in batteries. (3 23 88)

LRB-P-E-656 - The electrical system, batteries or APU can cause or be jeopardized by contamination during preparation for shipment of the booster and ship loose hardware. -- Batteries will probably be shipped separately, perhaps directly from the

battery manufacturer to the launch site. It is assumed that they will be protected from contamination during this time. (3 23 88)

LRB-P-E-657 - The electrical system, batteries or APU can cause or be jeopardized by contamination during transportation from manufacture to launch site or after recovery. -- This hazard is closely associated with hazard E-656; similar considerations apply. (3 23 88)

LRB-P-E-658 - The electrical system, batteries or APU can cause or be jeopardized by contamination during storage, including storage of major components. -- It is assumed that storage environment or protective packaging will protect batteries from contamination while in storage. (3 23 88)

LRB-P-E-659 - The electrical system, batteries or APU can cause or be jeopardized by contamination during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-660 - The electrical system, batteries or APU can cause or be jeopardized by contamination during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-661 - The electrical system, batteries or APU can cause or be jeopardized by contamination during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-662 - The electrical system, batteries or APU can cause or be jeopardized by contamination during propellant loading for test or flight. -- It is assumed that battery vents will not be capable of ingesting hazardous (contaminating) vapors during propellant loading. (3 23 88)

LRB-P-E-663 - The electrical system, batteries or APU can cause or be jeopardized by contamination during countdown to liftoff or abort. -- This does not appear to be a likely time for contamination to be a problem. (3 23 88)

LRB-P-E-664 - The electrical system, batteries or APU can cause or be jeopardized by contamination during launch abort activities, including mission postponement (scrub). -- This hazard is not credible. (3 23 88)

LRB-P-E-665 - The electrical system, batteries or APU can cause or be jeopardized by contamination during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (3 23 88)

LRB-P-E-666 - The electrical system, batteries or APU can cause or be jeopardized by contamination during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (3 23 88)

LRB-P-E-667 - The electrical system, batteries or APU can cause or be jeopardized by contamination during separation of the LRB from the STS vehicle. -- Potential sources of contamination could be the booster separation exhaust, but it is difficult to believe that this could cause a contamination problem for the electrical system. (3 23 88)

LRB-P-E-668 - The electrical system, batteries or APU can cause or be jeopardized by contamination during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-669 - The electrical system, batteries or APU can cause or be jeopardized by contamination during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-670 - The electrical system, batteries or APU can cause or be jeopardized by contamination during floatation (of recoverable boosters) until recovery. -- Obvious sources of contamination are seawater and windblown spray. It is assumed that the LRB will be designed to provide protection from damage from these sources. However, see hazard E-861. (3 23 88)

LRB-P-E-671 - The electrical system, batteries or APU can cause or be jeopardized by contamination during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-672 - The electrical system, batteries or APU can cause or be jeopardized by contamination during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-673 - The electrical system, batteries or APU can cause or be jeopardized by heat sources during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (3 23 88)

LRB-P-E-674 - The electrical system, batteries or APU can cause or be jeopardized by heat sources during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-675 - The electrical system, batteries or APU can cause or be jeopardized by heat sources during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-677 - The electrical system, batteries or APU can cause or be jeopardized by heat sources during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (3 23 88)

LRB-P-E-678 - The electrical system, batteries or APU can cause or be jeopardized by heat sources during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-680 - The electrical system, batteries or APU can cause or be jeopardized by heat sources during preparation for shipment of the booster and ship loose hardware. -- This hazard is not credible. (3 23 88)

LRB-P-E-681 - The electrical system, batteries or APU can cause or be jeopardized by heat sources during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-682 - The electrical system, batteries or APU can cause or be jeopardized by heat sources during storage, including storage of major components. -- It is assumed that storage conditions will be appropriate for the components or assemblies being stored. (3 23 88)

LRB-P-E-683 - The electrical system, batteries or APU can cause or be jeopardized by heat sources during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-684 - The electrical system, batteries or APU can cause or be jeopardized by heat sources during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-685 - The electrical system, batteries or APU can cause or be jeopardized by heat sources during rollout from the VAB and preloading preparation. -- This hazard is not credible. (3 23 88)

LRB-P-E-687 - The electrical system, batteries or APU can cause or be jeopardized by heat sources during countdown to liftoff or abort. -- This is essentially the same hazard as E-686. (3 23 88)

LRB-P-E-688 - The electrical system, batteries or APU can cause or be jeopardized by heat sources during launch abort activities, including mission postponement (scrub). -- If hazards are mitigated by purging, it will be necessary to reestablish the purge gas flow within a specified time after launch abort. (3 23 88)

LRB-P-E-689 - The electrical system, batteries or APU can cause or be jeopardized by heat sources during nominal flight from liftoff to LRB burnout. -- This is essentially the same as E-679; similar considerations apply. See also hazard E-857. (3 23 88)

LRB-P-E-690 - The electrical system, batteries or APU can cause or be jeopardized by heat sources during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-691 - The electrical system, batteries or APU can cause or be jeopardized by heat sources during separation of the LRB from the STS vehicle. -- Obvious heat sources are booster separation motor exhaust plumes. The possibility of danger from plume impingement on and redirection from the ET should be examined. An analysis of one aspect of this hazard is presented as B-691. (3 23 88)

LRB-P-E-692 - The electrical system, batteries or APU can cause or be jeopardized by heat sources during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-693 - The electrical system, batteries or APU can cause or be jeopardized by heat sources during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-694 - The electrical system, batteries or APU can cause or be jeopardized by heat sources during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-695 - The electrical system, batteries or APU can cause or be jeopardized by heat sources during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-696 - The electrical system, batteries or APU can cause or be jeopardized by heat sources during refurbishment of reusable components. -- This hazard is not credible. (3 23 88)

LRB-P-E-721 - The electrical system, batteries or APU can cause or be jeopardized by moisture or precipitation during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (3 23 88)

LRB-P-E-722 - The electrical system, batteries or APU can cause or be jeopardized by moisture or precipitation during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-723 - The electrical system, batteries or APU can cause or be jeopardized by moisture or precipitation during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-725 - The electrical system, batteries or APU can cause or be jeopardized by moisture or precipitation during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-726 - The electrical system, batteries or APU can cause or be jeopardized by moisture or precipitation during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-727 - The electrical system, batteries or APU can cause or be jeopardized by moisture or precipitation during flight readiness firing (FRF) of the STS vehicle. -- It is assumed that drain holes will be provided for rainwater. However, this hazard will be analyzed under E-734. (3 23 88)

LRB-P-E-729 - The electrical system, batteries or APU can cause or be jeopardized by moisture or precipitation during transportation from manufacture to launch site or after recovery. -- This is essentially the same hazard as E-728. (3 23 88)

LRB-P-E-730 - The electrical system, batteries or APU can cause or be jeopardized by moisture or precipitation during storage, including storage of major components. -- It is assumed that the booster will be stored where moisture and precipitation will not be a problem. (3 23 88)

LRB-P-E-731 - The electrical system, batteries or APU can cause or be jeopardized by moisture or precipitation during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-732 - The electrical system, batteries or APU can cause or be jeopardized by moisture or precipitation during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-733 - The electrical system, batteries or APU can cause or be jeopardized by moisture or precipitation during rollout from the VAB and preloading preparation. -- This hazard will be analyzed under E-734. (3 23 88)

LRB-P-E-735 - The electrical system, batteries or APU can cause or be jeopardized by moisture or precipitation during countdown to liftoff or abort. -- This is essentially the same hazard as E-734 (3 23 88)

LRB-P-E-736 - The electrical system, batteries or APU can cause or be jeopardized by moisture or precipitation during launch abort activities, including mission postponement (scrub). -- This is essentially the same hazard as E-734. If purge gas is turned off prior to launch, it will have to be reestablished after a launch abort. (3 23 88)

LRB-P-E-738 - The electrical system, batteries or APU can cause or be jeopardized by moisture or precipitation during intact abort, including RTLS, TAL, AOA and ATO. -- This is essentially the same as E-737. (3 23 88)

LRB-P-E-740 - The electrical system, batteries or APU can cause or be jeopardized by moisture or precipitation during descent from separation to ocean impact. -- At the

current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-741 - The electrical system, batteries or APU can cause or be jeopardized by moisture or precipitation during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-742 - The electrical system, batteries or APU can cause or be jeopardized by moisture or precipitation during floatation (of recoverable boosters) until recovery. -- It is assumed that adequate design features will be incorporated to protect recoverable boosters from the damaging effects of seawater intrusion. (3 23 88)

LRB-P-E-743 - The electrical system, batteries or APU can cause or be jeopardized by moisture or precipitation during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-744 - The electrical system, batteries or APU can cause or be jeopardized by moisture or precipitation during refurbishment of reusable components. -- This hazard is not credible. (3 23 88)

LRB-P-E-745 - The electrical system, batteries or APU can cause or be jeopardized by electrical system malfunction during component or material purchase, including acquisition of GFP. -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-746 - The electrical system, batteries or APU can cause or be jeopardized by electrical system malfunction during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-749 - The electrical system, batteries or APU can cause or be jeopardized by electrical system malfunction during acceptance test and checkout prior to delivery to the Government. -- Since acceptance tests are walkdown and documentation examinations, this hazard is not credible. (3 23 88)

LRB-P-E-750 - The electrical system, batteries or APU can cause or be jeopardized by electrical system malfunction during test firing of engines and/or the completed booster. -- This is essentially the same hazard as E-747. (3 23 88)

LRB-P-E-751 - The electrical system, batteries or APU can cause or be jeopardized by electrical system malfunction during flight readiness firing (FRF) of the STS vehicle. -- This is essentially the same hazard as E-747 or E-761, both of which will be analyzed. (3 23 88)

LRB-P-E-752 - The electrical system, batteries or APU can cause or be jeopardized

by electrical system malfunction during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-753 - The electrical system, batteries or APU can cause or be jeopardized by electrical system malfunction during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-754 - The electrical system, batteries or APU can cause or be jeopardized by electrical system malfunction during storage, including storage of major components. -- It is assumed that the completed LRB and stored components will not require such strict environmental control that temporary failure of environmental controls, such as might be encountered in an industrial storage facility, would be hazardous. (3 23 88)

LRB-P-E-755 - The electrical system, batteries or APU can cause or be jeopardized by electrical system malfunction during preflight checkout prior to stacking. -- This is essentially the same hazard as E-747. (3 23 88)

LRB-P-E-756 - The electrical system, batteries or APU can cause or be jeopardized by electrical system malfunction during vehicle stacking, including ancillary test activities. -- This is essentially the same hazard as E-747. (3 23 88)

LRB-P-E-757 - The electrical system, batteries or APU can cause or be jeopardized by electrical system malfunction during rollout from the VAB and preloading preparation. -- This is essentially the same hazard as E-747. (3 23 88)

LRB-P-E-760 - The electrical system, batteries or APU can cause or be jeopardized by electrical system malfunction during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-762 - The electrical system, batteries or APU can cause or be jeopardized by electrical system malfunction during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is essentially the same as E-761; similar considerations apply. (3 23 88)

LRB-P-E-764 - The electrical system, batteries or APU can cause or be jeopardized by electrical system malfunction during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-765 - The electrical system, batteries or APU can cause or be jeopardized by electrical system malfunction during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-766 - The electrical system, batteries or APU can cause or be jeopardized by electrical system malfunction during floatation (of recoverable boosters) until recovery. -- It is assumed that recoverable LRB electronics will be designed to withstand immersion in seawater. (3 23 88)

LRB-P-E-768 - The electrical system, batteries or APU can cause or be jeopardized by electrical system malfunction during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-769 - The electrical system, batteries or APU can cause or be jeopardized by differential pressure during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (3 23 88)

LRB-P-E-770 - The electrical system, batteries or APU can cause or be jeopardized by differential pressure during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (3 23 88)

LRB-P-E-771 - The electrical system, batteries or APU can cause or be jeopardized by differential pressure during inspection and test of the LRB and subsystems. -- It is assumed that batteries and other electrical components which have cavities which could allow the imposition of differential pressures will be capable of withstanding pressure differentials encountered on the ground and in flight. (3 23 88)

LRB-P-E-773 - The electrical system, batteries or APU can cause or be jeopardized by differential pressure during acceptance test and checkout prior to delivery to the Government. -- See comment for E-771. (3 23 88)

LRB-P-E-774 - The electrical system, batteries or APU can cause or be jeopardized by differential pressure during test firing of engines and/or the completed booster. -- See comment for E-771. (3 23 88)

LRB-P-E-777 - The electrical system, batteries or APU can cause or be jeopardized by differential pressure during transportation from manufacture to launch site or after recovery. -- This is essentially the same hazard as E-776. (3 24 88)

LRB-P-E-778 - The electrical system, batteries or APU can cause or be jeopardized by differential pressure during storage, including storage of major components. -- This is essentially the same hazard as E-776. (3 24 88)

LRB-P-E-779 - The electrical system, batteries or APU can cause or be jeopardized by differential pressure during preflight checkout prior to stacking. -- This is essentially the same hazard as E-776. (3 24 88)

LRB-P-E-780 - The electrical system, batteries or APU can cause or be jeopardized by differential pressure during vehicle stacking, including ancillary test activities. --

This is essentially the same hazard as E-776. (3 24 88)

LRB-P-E-781 - The electrical system, batteries or APU can cause or be jeopardized by differential pressure during rollout from the VAB and preloading preparation. -- This is essentially the same hazard as E-776. (3 24 88)

LRB-P-E-782 - The electrical system, batteries or APU can cause or be jeopardized by differential pressure during propellant loading for test or flight. -- This is essentially the same hazard as E-775. (3 24 88)

LRB-P-E-783 - The electrical system, batteries or APU can cause or be jeopardized by differential pressure during countdown to liftoff or abort. -- This is essentially the same hazard as E-775. (3 24 88)

LRB-P-E-784 - The electrical system, batteries or APU can cause or be jeopardized by differential pressure during launch abort activities, including mission postponement (scrub). -- This is essentially the same hazard as E-775. (3 24 88)

LRB-P-E-785 - The electrical system, batteries or APU can cause or be jeopardized by differential pressure during nominal flight from liftoff to LRB burnout. -- This is essentially the same hazard as E-775. (3 24 88)

LRB-P-E-786 - The electrical system, batteries or APU can cause or be jeopardized by differential pressure during intact abort, including RTLS, TAL, AOA and ATO. -- This is essentially the same hazard as E-775. (3 24 88)

LRB-P-E-788 - The electrical system, batteries or APU can cause or be jeopardized by differential pressure during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-789 - The electrical system, batteries or APU can cause or be jeopardized by differential pressure during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-790 - The electrical system, batteries or APU can cause or be jeopardized by differential pressure during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-791 - The electrical system, batteries or APU can cause or be jeopardized by differential pressure during recovery activities, including towing, and retrieval of recoverables. -- If recovery activities involve towing the boosters in such a manner that pressure sensor reference ports are pressurized by dynamic head, this hazard will have to be evaluated. At this time, this does not appear to be a problem. (3 24 88)

LRB-P-E-792 - The electrical system, batteries or APU can cause or be jeopardized by differential pressure during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-793 - The electrical system, batteries or APU can cause or be jeopardized by vibration, acoustic loads or shock during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (3 24 88)

LRB-P-E-794 - The electrical system, batteries or APU can cause or be jeopardized by vibration, acoustic loads or shock during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-795 - The electrical system, batteries or APU can cause or be jeopardized by vibration, acoustic loads or shock during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-797 - The electrical system, batteries or APU can cause or be jeopardized by vibration, acoustic loads or shock during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-799 - The electrical system, batteries or APU can cause or be jeopardized by vibration, acoustic loads or shock during flight readiness firing (FRF) of the STS vehicle. -- This is essentially the same hazard as E-798. (3 24 88)

LRB-P-E-800 - The electrical system, batteries or APU can cause or be jeopardized by vibration, acoustic loads or shock during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-801 - The electrical system, batteries or APU can cause or be jeopardized by vibration, acoustic loads or shock during transportation from manufacture to launch site or after recovery. -- It is assumed that the combination of packaging and transportation mode can be chosen to preclude damage to any assembly being transported. (3 24 88)

LRB-P-E-802 - The electrical system, batteries or APU can cause or be jeopardized by vibration, acoustic loads or shock during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-803 - The electrical system, batteries or APU can cause or be jeopardized by vibration, acoustic loads or shock during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-804 - The electrical system, batteries or APU can cause or be jeopardized by vibration, acoustic loads or shock during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-805 - The electrical system, batteries or APU can cause or be jeopardized by vibration, acoustic loads or shock during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-806 - The electrical system, batteries or APU can cause or be jeopardized by vibration, acoustic loads or shock during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-807 - The electrical system, batteries or APU can cause or be jeopardized by vibration, acoustic loads or shock during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-808 - The electrical system, batteries or APU can cause or be jeopardized by vibration, acoustic loads or shock during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-809 - The electrical system, batteries or APU can cause or be jeopardized by vibration, acoustic loads or shock during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-810 - The electrical system, batteries or APU can cause or be jeopardized by vibration, acoustic loads or shock during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-811 - The electrical system, batteries or APU can cause or be jeopardized by vibration, acoustic loads or shock during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-812 - The electrical system, batteries or APU can cause or be jeopardized by vibration, acoustic loads or shock during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-813 - The electrical system, batteries or APU can cause or be jeopardized by vibration, acoustic loads or shock during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-814 - The electrical system, batteries or APU can cause or be jeopardized

by vibration, acoustic loads or shock during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-815 - The electrical system, batteries or APU can cause or be jeopardized by vibration, acoustic loads or shock during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-816 - The electrical system, batteries or APU can cause or be jeopardized by vibration, acoustic loads or shock during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-841 - The electrical system, batteries or APU can cause or be jeopardized by leaks during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (3 24 88)

LRB-P-E-842 - The electrical system, batteries or APU can cause or be jeopardized by leaks during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-845 - The electrical system, batteries or APU can cause or be jeopardized by leaks during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-846 - The electrical system, batteries or APU can cause or be jeopardized by leaks during test firing of engines and/or the completed booster. -- This hazard is associated with E-854. (3 24 88)

LRB-P-E-847 - The electrical system, batteries or APU can cause or be jeopardized by leaks during flight readiness firing (FRF) of the STS vehicle. -- This hazard is associated with E-854. See also E-775. (3 24 88)

LRB-P-E-848 - The electrical system, batteries or APU can cause or be jeopardized by leaks during preparation for shipment of the booster and ship loose hardware. -- This hazard is not credible. (3 24 88)

LRB-P-E-849 - The electrical system, batteries or APU can cause or be jeopardized by leaks during transportation from manufacture to launch site or after recovery. -- If systems are pressurized, leakage during transportation may be a problem, but evaluation of this hazard with respect to the electrical system is not possible at this stage of design maturity. (3 24 88)

LRB-P-E-850 - The electrical system, batteries or APU can cause or be jeopardized by leaks during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-851 - The electrical system, batteries or APU can cause or be jeopardized by leaks during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-852 - The electrical system, batteries or APU can cause or be jeopardized by leaks during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-853 - The electrical system, batteries or APU can cause or be jeopardized by leaks during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-855 - The electrical system, batteries or APU can cause or be jeopardized by leaks during countdown to liftoff or abort. -- This is essentially the same hazard as E-854. (3 24 88)

LRB-P-E-856 - The electrical system, batteries or APU can cause or be jeopardized by leaks during launch abort activities, including mission postponement (scrub). -- This is essentially the same hazard as E-854 (3 24 88)

LRB-P-E-858 - The electrical system, batteries or APU can cause or be jeopardized by leaks during intact abort, including RTLS, TAL, AOA and ATO. -- This is essentially the same hazard as E-854. (3 24 88)

LRB-P-E-859 - The electrical system, batteries or APU can cause or be jeopardized by leaks during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-860 - The electrical system, batteries or APU can cause or be jeopardized by leaks during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-862 - The electrical system, batteries or APU can cause or be jeopardized by leaks during floatation (of recoverable boosters) until recovery. -- This is essentially the same hazard as E-861. (3 24 88)

LRB-P-E-863 - The electrical system, batteries or APU can cause or be jeopardized by leaks during recovery activities, including towing, and retrieval of recoverables. -- This is essentially the same hazard as E-861. (3 24 88)

LRB-P-E-864 - The electrical system, batteries or APU can cause or be jeopardized by leaks during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-865 - The electrical system, batteries or APU can cause or be jeopardized by propellant characteristics and products during component or material purchase,

including acquisition of GFP. -- This hazard is not credible. (3 24 88)

LRB-P-E-866 - The electrical system, batteries or APU can cause or be jeopardized by propellant characteristics and products during manufacture and fabrication of subsystems and components. -- This hazard is not credible. (3 24 88)

LRB-P-E-867 - The electrical system, batteries or APU can cause or be jeopardized by propellant characteristics and products during inspection and test of the LRB and subsystems. -- This hazard is not credible. (3 24 88)

LRB-P-E-869 - The electrical system, batteries or APU can cause or be jeopardized by propellant characteristics and products during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (3 24 88)

LRB-P-E-870 - The electrical system, batteries or APU can cause or be jeopardized by propellant characteristics and products during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-871 - The electrical system, batteries or APU can cause or be jeopardized by propellant characteristics and products during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-872 - The electrical system, batteries or APU can cause or be jeopardized by propellant characteristics and products during preparation for shipment of the booster and ship loose hardware. -- This hazard is not credible. (3 24 88)

LRB-P-E-873 - The electrical system, batteries or APU can cause or be jeopardized by propellant characteristics and products during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (3 24 88)

LRB-P-E-874 - The electrical system, batteries or APU can cause or be jeopardized by propellant characteristics and products during storage, including storage of major components. -- This hazard is not credible. (3 24 88)

LRB-P-E-875 - The electrical system, batteries or APU can cause or be jeopardized by propellant characteristics and products during preflight checkout prior to stacking. -- This hazard is not credible. (3 24 88)

LRB-P-E-876 - The electrical system, batteries or APU can cause or be jeopardized by propellant characteristics and products during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (3 24 88)

LRB-P-E-877 - The electrical system, batteries or APU can cause or be jeopardized by propellant characteristics and products during rollout from the VAB and

preloading preparation. -- This hazard is not credible. (3 24 88)

LRB-P-E-879 - The electrical system, batteries or APU can cause or be jeopardized by propellant characteristics and products during countdown to liftoff or abort. -- This is essentially the same hazard as E-878. (3 24 88)

LRB-P-E-880 - The electrical system, batteries or APU can cause or be jeopardized by propellant characteristics and products during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-881 - The electrical system, batteries or APU can cause or be jeopardized by propellant characteristics and products during nominal flight from liftoff to LRB burnout. -- Products of RP-1/LOX are mainly carbon dioxide and water, with small amounts of carbon monoxide, hydrocarbons, and oxides of nitrogen. None of these is particularly hazardous to electronic assemblies. (3 24 88)

LRB-P-E-882 - The electrical system, batteries or APU can cause or be jeopardized by propellant characteristics and products during intact abort, including RTLS, TAL, AOA and ATO. -- This is the same hazard as E-881, with the exception that early separation of the boosters will probably result in destruction of the boosters, including electrical systems. (3 24 88)

LRB-P-E-883 - The electrical system, batteries or APU can cause or be jeopardized by propellant characteristics and products during separation of the LRB from the STS vehicle. -- Residual oxygen venting may be a hazard, but at this stage of maturity this hazard cannot be properly analyzed. (3 24 88)

LRB-P-E-884 - The electrical system, batteries or APU can cause or be jeopardized by propellant characteristics and products during descent from separation to ocean impact. -- This hazard is not credible. (3 24 88)

LRB-P-E-885 - The electrical system, batteries or APU can cause or be jeopardized by propellant characteristics and products during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-886 - The electrical system, batteries or APU can cause or be jeopardized by propellant characteristics and products during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-887 - The electrical system, batteries or APU can cause or be jeopardized by propellant characteristics and products during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (3 24 88)

LRB-P-E-888 - The electrical system, batteries or APU can cause or be jeopardized by propellant characteristics and products during refurbishment of reusable components. -- This hazard is not credible. (3 24 88)

LRB-P-E-889 - The electrical system, batteries or APU can cause or be jeopardized by lightning or electromagnetic discharge during component or material purchase, including acquisition of GFP. -- At the current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-893 - The electrical system, batteries or APU can cause or be jeopardized by lightning or electromagnetic discharge during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-896 - The electrical system, batteries or APU can cause or be jeopardized by lightning or electromagnetic discharge during preparation for shipment of the booster and ship loose hardware. -- This is essentially the same hazard as E-891. (3 25 88)

LRB-P-E-897 - The electrical system, batteries or APU can cause or be jeopardized by lightning or electromagnetic discharge during transportation from manufacture to launch site or after recovery. -- This is essentially the same hazard as E-894; similar considerations apply. (3 25 88)

LRB-P-E-898 - The electrical system, batteries or APU can cause or be jeopardized by lightning or electromagnetic discharge during storage, including storage of major components. -- It is assumed that boosters will be stored in areas where they are protected from the damaging effects of lightning. (3 25 88)

LRB-P-E-899 - The electrical system, batteries or APU can cause or be jeopardized by lightning or electromagnetic discharge during preflight checkout prior to stacking. -- This is essentially the same hazard as E-891; similar considerations apply. (3 25 88)

LRB-P-E-900 - The electrical system, batteries or APU can cause or be jeopardized by lightning or electromagnetic discharge during vehicle stacking, including ancillary test activities. -- This is essentially the same hazard as E-891 or E-895; similar considerations apply. (3 25 88)

LRB-P-E-901 - The electrical system, batteries or APU can cause or be jeopardized by lightning or electromagnetic discharge during rollout from the VAB and preloading preparation. -- This is the same hazard as E-895. (3 25 88)

LRB-P-E-902 - The electrical system, batteries or APU can cause or be jeopardized by lightning or electromagnetic discharge during propellant loading for test or flight. -- This is the same hazard as E-895. (3 25 88)

LRB-P-E-903 - The electrical system, batteries or APU can cause or be jeopardized by lightning or electromagnetic discharge during countdown to liftoff or abort. -- This is the same hazard as E-895. (3 25 88)

LRB-P-E-904 - The electrical system, batteries or APU can cause or be jeopardized by lightning or electromagnetic discharge during launch abort activities, including mission postponement (scrub). -- This is the same hazard as E-895. (3 25 88)

LRB-P-E-906 - The electrical system, batteries or APU can cause or be jeopardized by lightning or electromagnetic discharge during intact abort, including RTLS, TAL, AOA and ATO. -- This is essentially the same hazard as E-895 and E-905. (3 25 88)

LRB-P-E-907 - The electrical system, batteries or APU can cause or be jeopardized by lightning or electromagnetic discharge during separation of the LRB from the STS vehicle. -- At separation altitude, lightning is not likely to be a problem. (3 25 88)

LRB-P-E-908 - The electrical system, batteries or APU can cause or be jeopardized by lightning or electromagnetic discharge during descent from separation to ocean impact. -- This hazard is evaluated as D-908. See also I-908. (3 25 88)

LRB-P-E-909 - The electrical system, batteries or APU can cause or be jeopardized by lightning or electromagnetic discharge during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-910 - The electrical system, batteries or APU can cause or be jeopardized by lightning or electromagnetic discharge during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-911 - The electrical system, batteries or APU can cause or be jeopardized by lightning or electromagnetic discharge during recovery activities, including towing, and retrieval of recoverables. -- Although it is obvious that attempt to recover boosters during a thunderstorm would be more hazardous than in good weather, the specific hazards involved cannot be adequately analyzed at this time. (3 25 88)

LRB-P-E-912 - The electrical system, batteries or APU can cause or be jeopardized by lightning or electromagnetic discharge during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-937 - The electrical system, batteries or APU can cause or be jeopardized by chemical activity during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (3 25 88)

LRB-P-E-938 - The electrical system, batteries or APU can cause or be jeopardized

by chemical activity during manufacture and fabrication of subsystems and components. -- This hazard is not credible. (3 25 88)

LRB-P-E-939 - The electrical system, batteries or APU can cause or be jeopardized by chemical activity during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-941 - The electrical system, batteries or APU can cause or be jeopardized by chemical activity during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-942 - The electrical system, batteries or APU can cause or be jeopardized by chemical activity during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-943 - The electrical system, batteries or APU can cause or be jeopardized by chemical activity during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-944 - The electrical system, batteries or APU can cause or be jeopardized by chemical activity during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-945 - The electrical system, batteries or APU can cause or be jeopardized by chemical activity during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-946 - The electrical system, batteries or APU can cause or be jeopardized by chemical activity during storage, including storage of major components. -- Although there may be hazards associated with limited storage life of certain components, it is assumed that these will be identified as the design progresses. This hazard is not amenable to further analysis at this time. (3 25 88)

LRB-P-E-947 - The electrical system, batteries or APU can cause or be jeopardized by chemical activity during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-948 - The electrical system, batteries or APU can cause or be jeopardized by chemical activity during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-949 - The electrical system, batteries or APU can cause or be jeopardized by chemical activity during rollout from the VAB and preloading preparation. -- At the

current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-950 - The electrical system, batteries or APU can cause or be jeopardized by chemical activity during propellant loading for test or flight. -- Multiple launch aborts or tests may degrade time-sensitive components. It is assumed that these will be identified in the design and that adequate measures will be taken to replace these components if and when necessary. (3 25 88)

LRB-P-E-951 - The electrical system, batteries or APU can cause or be jeopardized by chemical activity during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-952 - The electrical system, batteries or APU can cause or be jeopardized by chemical activity during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-953 - The electrical system, batteries or APU can cause or be jeopardized by chemical activity during nominal flight from liftoff to LRB burnout. -- Since this is the design condition, it is assumed that all appropriate measures will be taken to prevent unwanted chemical reactions during this time. (3 25 88)

LRB-P-E-954 - The electrical system, batteries or APU can cause or be jeopardized by chemical activity during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-955 - The electrical system, batteries or APU can cause or be jeopardized by chemical activity during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-956 - The electrical system, batteries or APU can cause or be jeopardized by chemical activity during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-957 - The electrical system, batteries or APU can cause or be jeopardized by chemical activity during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-958 - The electrical system, batteries or APU can cause or be jeopardized by chemical activity during floatation (of recoverable boosters) until recovery. -- Although seawater is an obvious reagent for many processes, it is assumed that the design of recoverable boosters will take this into consideration. (3 25 88)

LRB-P-E-959 - The electrical system, batteries or APU can cause or be jeopardized by chemical activity during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-960 - The electrical system, batteries or APU can cause or be jeopardized by chemical activity during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-961 - The electrical system, batteries or APU can cause or be jeopardized by computer system malfunction during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (3 25 88)

LRB-P-E-962 - The electrical system, batteries or APU can cause or be jeopardized by computer system malfunction during manufacture and fabrication of subsystems and components. -- This is essentially the same hazard as E-890; similar considerations apply. (3 25 88)

LRB-P-E-965 - The electrical system, batteries or APU can cause or be jeopardized by computer system malfunction during acceptance test and checkout prior to delivery to the Government. -- This is essentially the same hazard as E-963. (3 25 88)

LRB-P-E-966 - The electrical system, batteries or APU can cause or be jeopardized by computer system malfunction during test firing of engines and/or the completed booster. -- This is essentially the same hazard as E-963. (3 25 88)

LRB-P-E-968 - The electrical system, batteries or APU can cause or be jeopardized by computer system malfunction during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-969 - The electrical system, batteries or APU can cause or be jeopardized by computer system malfunction during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (3 25 88)

LRB-P-E-970 - The electrical system, batteries or APU can cause or be jeopardized by computer system malfunction during storage, including storage of major components. -- This hazard is not credible. (3 25 88)

LRB-P-E-971 - The electrical system, batteries or APU can cause or be jeopardized by computer system malfunction during preflight checkout prior to stacking. -- This is essentially the same hazard as E-963. (3 25 88)

LRB-P-E-972 - The electrical system, batteries or APU can cause or be jeopardized by computer system malfunction during vehicle stacking, including ancillary test activities. -- This is essentially the same hazard as E-963. (3 25 88)

LRB-P-E-973 - The electrical system, batteries or APU can cause or be jeopardized by computer system malfunction during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-974 - The electrical system, batteries or APU can cause or be jeopardized by computer system malfunction during propellant loading for test or flight. -- This is essentially the same hazard as E-967. (3 25 88)

LRB-P-E-975 - The electrical system, batteries or APU can cause or be jeopardized by computer system malfunction during countdown to liftoff or abort. -- This is essentially the same hazard as E-967 (3 25 88)

LRB-P-E-976 - The electrical system, batteries or APU can cause or be jeopardized by computer system malfunction during launch abort activities, including mission postponement (scrub). -- This is essentially the same hazard as E-967. It is also evaluated as D-760. (3 25 88)

LRB-P-E-978 - The electrical system, batteries or APU can cause or be jeopardized by computer system malfunction during intact abort, including RTLS, TAL, AOA and ATO. -- This is essentially the same hazard as E-977. It is also evaluated as D-762. (3 25 88)

LRB-P-E-979 - The electrical system, batteries or APU can cause or be jeopardized by computer system malfunction during separation of the LRB from the STS vehicle. -- Inasmuch as this hazard pertains to interaction between the LRB and other STS components, it is essentially the same as E-977. If the LRB contains computerized systems which operate autonomously during or after separation, there may be hazards associated with the operation of that system which cannot be evaluated at this time. (3 25 88)

LRB-P-E-980 - The electrical system, batteries or APU can cause or be jeopardized by computer system malfunction during descent from separation to ocean impact. -- This hazard is associated with E-979. (3 25 88)

LRB-P-E-981 - The electrical system, batteries or APU can cause or be jeopardized by computer system malfunction during splashdown events occuring at impact (disposable for expendables). -- This hazard is associated with E-979. (3 25 88)

LRB-P-E-982 - The electrical system, batteries or APU can cause or be jeopardized by computer system malfunction during floatation (of recoverable boosters) until recovery. -- This hazard is associated with E-979. (3 25 88)

LRB-P-E-983 - The electrical system, batteries or APU can cause or be jeopardized by computer system malfunction during recovery activities, including towing, and retrieval of recoverables. -- This hazard is associated with E-767, but cannot be properly evaluated at the current stage of design maturity. (3 25 88)

LRB-P-E-984 - The electrical system, batteries or APU can cause or be jeopardized by computer system malfunction during refurbishment of reusable components. -- This hazard is associated with E-963. (3 25 88)

LRB-P-E-1009 - The electrical system, batteries or APU can cause or be jeopardized by wear during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (3 25 88)

LRB-P-E-1010 - The electrical system, batteries or APU can cause or be jeopardized by wear during manufacture and fabrication of subsystems and components. -- This hazard is not credible. (3 25 88)

LRB-P-E-1013 - The electrical system, batteries or APU can cause or be jeopardized by wear during acceptance test and checkout prior to delivery to the Government. -- Since acceptance tests are usually walkdown and documentation inspections, this hazard is assumed not to exist. If it does exist, it is the same as E-1011. (3 25 88)

LRB-P-E-1014 - The electrical system, batteries or APU can cause or be jeopardized by wear during test firing of engines and/or the completed booster. -- This hazard is essentially the same as E-1011. (3 25 88)

LRB-P-E-1015 - The electrical system, batteries or APU can cause or be jeopardized by wear during flight readiness firing (FRF) of the STS vehicle. -- This hazard is essentially the same as E-1011. (3 25 88)

LRB-P-E-1016 - The electrical system, batteries or APU can cause or be jeopardized by wear during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-1017 - The electrical system, batteries or APU can cause or be jeopardized by wear during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-1018 - The electrical system, batteries or APU can cause or be jeopardized by wear during storage, including storage of major components. -- This hazard is essentially the same as E-776. (3 25 88)

LRB-P-E-1019 - The electrical system, batteries or APU can cause or be jeopardized by wear during preflight checkout prior to stacking. -- This hazard is essentially the same as E-1011. (3 25 88)

LRB-P-E-1020 - The electrical system, batteries or APU can cause or be jeopardized by wear during vehicle stacking, including ancillary st activities. -- This hazard is essentially the same as E-1011. (3 25 88)

LRB-P-E-1021 - The electrical system, batteries or APU can cause or be jeopardized by wear during rollout from the VAB and preloading preparation. -- This hazard is essentially the same as E-776. (3 25 88)

LRB-P-E-1022 - The electrical system, batteries or APU can cause or be jeopardized

by wear during propellant loading for test or flight. -- This hazard is essentially the same as E-1011. (3 25 88)

LRB-P-E-1023 - The electrical system, batteries or APU can cause or be jeopardized by wear during countdown to liftoff or abort. -- This hazard is essentially the same as E-1011. (3 25 88)

LRB-P-E-1024 - The electrical system, batteries or APU can cause or be jeopardized by wear during launch abort activities, including mission postponement (scrub). -- This is essentially the same hazard as E-1011. (3 25 88)

LRB-P-E-1025 - The electrical system, batteries or APU can cause or be jeopardized by wear during nominal flight from liftoff to LRB burnout. -- This hazard arises from the effects of E-776 and is included in the analysis of that hazard. (3 25 88)

LRB-P-E-1026 - The electrical system, batteries or APU can cause or be jeopardized by wear during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard arises from E-776 and is analyzed with that hazard. (3 25 88)

LRB-P-E-1028 - The electrical system, batteries or APU can cause or be jeopardized by wear during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-1029 - The electrical system, batteries or APU can cause or be jeopardized by wear during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-1030 - The electrical system, batteries or APU can cause or be jeopardized by wear during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-1031 - The electrical system, batteries or APU can cause or be jeopardized by wear during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-1032 - The electrical system, batteries or APU can cause or be jeopardized by wear during refurbishment of reusable components. -- It is assumed that part of the refurbishment process will be checking or gauging of components to insure that wear is within acceptable limits. (3 25 88)

LRB-P-E-1033 - The electrical system, batteries or APU can cause or be jeopardized by emergencies during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (3 25 88)

LRB-P-E-1034 - The electrical system, batteries or APU can cause or be jeopardized by emergencies during manufacture and fabrication of subsystems and components.

-- At the current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-1037 - The electrical system, batteries or APU can cause or be jeopardized by emergencies during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-1038 - The electrical system, batteries or APU can cause or be jeopardized by emergencies during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-1040 - The electrical system, batteries or APU can cause or be jeopardized by emergencies during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-1041 - The electrical system, batteries or APU can cause or be jeopardized by emergencies during transportation from manufacture to launch site or after recovery. -- Since the booster is inherently less hazardous during transportation than the SRB segments, due to the lack of flammable or explosive propellant, it is assumed that procedures for handling transportation emergencies which have been established for SRB se gments will be sufficient for the LRBs as well. (3 25 88)

LRB-P-E-1042 - The electrical system, batteries or APU can cause or be jeopardized by emergencies during storage, including storage of major components. -- Analysis of this hazard would require analysis of what emergencies could take place during storage, which is not feasible at this time. (3 25 88)

LRB-P-E-1043 - The electrical system, batteries or APU can cause or be jeopardized by emergencies during preflight checkout prior to stacking. -- A detailed analysis of handling procedures at the checkout facility is required properly to analyze this hazard. (3 25 88)

LRB-P-E-1044 - The electrical system, batteries or APU can cause or be jeopardized by emergencies during vehicle stacking, including ancillary test activities. -- This hazard is similar to E-1043; similar considerations apply. (3 25 88)

LRB-P-E-1045 - The electrical system, batteries or APU can cause or be jeopardized by emergencies during rollout from the VAB and preloading preparation. -- It is assumed that current emergency plans, when reviewed for applicability to the LRB, will be sufficient. (3 25 88)

LRB-P-E-1046 - The electrical system, batteries or APU can cause or be jeopardized by emergencies during propellant loading for test or flight. -- This hazard is essentially the same as E-1039. (3 25 88)

LRB-P-E-1047 - The electrical system, batteries or APU can cause or be jeopardized by emergencies during countdown to liftoff or abort. -- This hazard is essentially the same as E-1039. (3 25 88)

LRB-P-E-1048 - The electrical system, batteries or APU can cause or be jeopardized by emergencies during launch abort activities, including mission postponement (scrub). -- This hazard is essentially the same as E-1039. (3 25 88)

LRB-P-E-1049 - The electrical system, batteries or APU can cause or be jeopardized by emergencies during nominal flight from liftoff to LRB burnout. -- Although the capability to shut down or vary the thrust of the LRB provides much greater inherent safety than that available with a solid booster system, the potential options for reaction to any given situation is correspondingly greater. The options available and the conditions under which they should be chosen must be the subject of a complete fault tree analysis, and cannot be evaluated at the current stange of design maturity. One as pect of this hazard is evaluated as B-761. (3 25 88)

LRB-P-E-1050 - The electrical system, batteries or APU can cause or be jeopardized by emergencies during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is essentially the same as E-1049. (3 25 88)

LRB-P-E-1051 - The electrical system, batteries or APU can cause or be jeopardized by emergencies during separation of the LRB from the STS vehicle. -- This hazard is essentially the same as E-1049. With respect to the booster separation system, it is evaluated as B-763. (3 25 88)

LRB-P-E-1052 - The electrical system, batteries or APU can cause or be jeopardized by emergencies during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-1053 - The electrical system, batteries or APU can cause or be jeopardized by emergencies during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-1054 - The electrical system, batteries or APU can cause or be jeopardized by emergencies during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-1055 - The electrical system, batteries or APU can cause or be jeopardized by emergencies during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (3 25 88)

LRB-P-E-1056 - The electrical system, batteries or APU can cause or be jeopardized by emergencies during refurbishment of reusable components. -- At the current state

of maturity, this hazard cannot be evaluated. (3 25 88)

THESE HAZARDS WERE CONSIDERED BY THE ANALYST BUT WERE NOT FURTHER ANALYZED FOR THE REASONS GIVEN

LRB-P-F-539 - Launch facilities can cause or be jeopardized by hazardous environments during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-540 - Launch facilities can cause or be jeopardized by hazardous environments during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-541 - Launch facilities can cause or be jeopardized by hazardous environments during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-542 - Launch facilities can cause or be jeopardized by hazardous environments during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-543 - Launch facilities can cause or be jeopardized by hazardous environments during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-544 - Launch facilities can cause or be jeopardized by hazardous environments during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-552 - Launch facilities can cause or be jeopardized by hazardous environments during refurbishment of reusable components. -- This hazard pertains to the refurbishment of facilities after launch. A complete analysis of the facilities requirements will be required properly to evaluate this hazard. (3 29 88)

LRB-P-F-563 - Launch facilities can cause or be jeopardized by worker overload during preflight checkout prior to stacking. -- This hazard is associated with F-002; similar considerations apply. (3 29 88)

LRB-P-F-564 - Launch facilities can cause or be jeopardized by worker overload during vehicle stacking, including ancillary test activities. -- This hazard is associated with F-002; similar considerations apply. (3 29 88)

LRB-P-F-565 - Launch facilities can cause or be jeopardized by worker overload during rollout from the VAB and preloading preparation. -- This hazard is associated with F-002; similar considerations apply. (3 29 88)

LRB-P-F-566 - Launch facilities can cause or be jeopardized by worker overload during propellant loading for test or flight. -- This hazard is associated with F-002;

similar considerations apply. (3 29 88)

LRB-P-F-567 - Launch facilities can cause or be jeopardized by worker overload during countdown to liftoff or abort. -- This is essentially the same hazard as F-002; similar considerations apply. (3 29 88)

LRB-P-F-568 - Launch facilities can cause or be jeopardized by worker overload during launch abort activities, including mission postponement (scrub). -- This is essentially the same hazard as F-002; similar considerations apply. (3 29 88)

LRB-P-F-576 - Launch facilities can cause or be jeopardized by worker overload during refurbishment of reusable components. -- Increased requirement for facility refurbishment, documented in F-535, may require increased workload. However, this hazard cannot be properly analyzed at this time. (3 29 88)

LRB-P-F-583 - Launch facilities can cause or be jeopardized by unsafe or unhygienic working conditions during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-587 - Launch facilities can cause or be jeopardized by unsafe or unhygienic working conditions during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-589 - Launch facilities can cause or be jeopardized by unsafe or unhygienic working conditions during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-590 - Launch facilities can cause or be jeopardized by unsafe or unhygienic working conditions during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-591 - Launch facilities can cause or be jeopardized by unsafe or unhygienic working conditions during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-592 - Launch facilities can cause or be jeopardized by unsafe or unhygienic working conditions during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-600 - Launch facilities can cause or be jeopardized by unsafe or unhygienic working conditions during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-655 - Launch facilities can cause or be jeopardized by contamination

during flight readiness firing (FRF) of the STS vehicle. -- Exhaust from the LRB is likely to be less contaminating than that from the SRB. Increased contamination is likely from a fuel leak or spill, since neither of these is possible with the SRB, but that is not this specific hazard. (3 29 88)

LRB-P-F-659 - Launch facilities can cause or be jeopardized by contamination during preflight checkout prior to stacking. -- Some consideration should be given to the requirements for contamination control within the propellant tanks, but this appears not to constitute a hazard at this time. (3 29 88)

LRB-P-F-660 - Launch facilities can cause or be jeopardized by contamination during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-661 - Launch facilities can cause or be jeopardized by contamination during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-662 - Launch facilities can cause or be jeopardized by contamination during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-663 - Launch facilities can cause or be jeopardized by contamination during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-664 - Launch facilities can cause or be jeopardized by contamination during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-672 - Launch facilities can cause or be jeopardized by contamination during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-679 - Launch facilities can cause or be jeopardized by heat sources during flight readiness firing (FRF) of the STS vehicle. -- This is essentially the same hazard as F-535. (3 29 88)

LRB-P-F-683 - Launch facilities can cause or be jeopardized by heat sources during preflight checkout prior to stacking. -- This hazard is not credible. (3 29 88)

LRB-P-F-684 - Launch facilities can cause or be jeopardized by heat sources during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (3 29 88)

LRB-P-F-685 - Launch facilities can cause or be jeopardized by heat sources during

rollout from the VAB and preloading preparation. -- This hazard is not credible. (3 29 88)

LRB-P-F-686 - Launch facilities can cause or be jeopardized by heat sources during propellant loading for test or flight. -- This hazard is not credible. (3 29 88)

LRB-P-F-687 - Launch facilities can cause or be jeopardized by heat sources during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-688 - Launch facilities can cause or be jeopardized by heat sources during launch abort activities, including mission postponement (scrub). -- This is essentially the same hazard as F-535. (3 29 88)

LRB-P-F-696 - Launch facilities can cause or be jeopardized by heat sources during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-751 - Launch facilities can cause or be jeopardized by electrical system malfunction during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed under A-751. (3 29 88)

LRB-P-F-755 - Launch facilities can cause or be jeopardized by electrical system malfunction during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-756 - Launch facilities can cause or be jeopardized by electrical system malfunction during vehicle stacking, including ancillary test activities. -- This is one of the hazards analyzed in E-747. (3 29 88)

LRB-P-F-757 - Launch facilities can cause or be jeopardized by electrical system malfunction during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-758 - Launch facilities can cause or be jeopardized by electrical system malfunction during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-759 - Launch facilities can cause or be jeopardized by electrical system malfunction during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-760 - Launch facilities can cause or be jeopardized by electrical system malfunction during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-768 - Launch facilities can cause or be jeopardized by electrical system malfunction during refurbishment of reusable components. -- This hazard is not credible. (3 29 88)

LRB-P-F-775 - Launch facilities can cause or be jeopardized by differential pressure during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-779 - Launch facilities can cause or be jeopardized by differential pressure during preflight checkout prior to stacking. -- This hazard is not credible. (3 29 88)

LRB-P-F-780 - Launch facilities can cause or be jeopardized by differential pressure during vehicle stacking, including ancillary test activities. -- It is assumed that breather equipment will be capable of maintaining a pressure in each tank sufficient to maintain tank cleanliness with a negligible hazard of overpressurization. (3 29 88)

LRB-P-F-781 - Launch facilities can cause or be jeopardized by differential pressure during rollout from the VAB and preloading preparation. -- Preload pressurization to maintain tank cleanliness will be required. It is assumed that this can be accomplished with the required degree of safety. (3 29 88)

LRB-P-F-782 - Launch facilities can cause or be jeopardized by differential pressure during propellant loading for test or flight. -- Since loading is so critical, it is assumed that sufficient safety devices and procedures will be employed to preclude pressurization problems during loading. (3 29 88)

LRB-P-F-783 - Launch facilities can cause or be jeopardized by differential pressure during countdown to liftoff or abort. -- This is essentially the same hazard as F-782. (3 29 88)

LRB-P-F-784 - Launch facilities can cause or be jeopardized by differential pressure during launch abort activities, including mission postponement (scrub). -- This is essentially the same hazard as F-782. (3 29 88)

LRB-P-F-792 - Launch facilities can cause or be jeopardized by differential pressure during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-799 - Launch facilities can cause or be jeopardized by vibration, acoustic loads or shock during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as F-535. (3 29 88)

LRB-P-F-803 - Launch facilities can cause or be jeopardized by vibration, acoustic loads or shock during preflight checkout prior to stacking. -- This hazard is not credible. (3 29 88)

LRB-P-F-804 - Launch facilities can cause or be jeopardized by vibration, acoustic loads or shock during vehicle stacking, including ancillary test activities. -- It is assumed that the booster vehicle will not be subjected to damaging shocks during stacking, although this is possible if proper safety precautions are not taken (3 29 88)

LRB-P-F-805 - Launch facilities can cause or be jeopardized by vibration, acoustic loads or shock during rollout from the VAB and preloading preparation. -- This hazard is not credible. (3 29 88)

LRB-P-F-806 - Launch facilities can cause or be jeopardized by vibration, acoustic loads or shock during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-807 - Launch facilities can cause or be jeopardized by vibration, acoustic loads or shock during countdown to liftoff or abort. -- This is essentially the same hazard analyzed as F-535. (3 29 88)

LRB-P-F-808 - Launch facilities can cause or be jeopardized by vibration, acoustic loads or shock during launch abort activities, including mission postponement (scrub). -- This hazard is a part of that analyzed in F-535. (3 29 88)

LRB-P-F-816 - Launch facilities can cause or be jeopardized by vibration, acoustic loads or shock during refurbishment of reusable components. -- This hazard is not credible. (3 29 88)

LRB-P-F-827 - Launch facilities can cause or be jeopardized by structural loads during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-828 - Launch facilities can cause or be jeopardized by structural loads during vehicle stacking, including ancillary test activities. -- This hazard is analyzed as F-588. (3 29 88)

LRB-P-F-829 - Launch facilities can cause or be jeopardized by structural loads during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-830 - Launch facilities can cause or be jeopardized by structural loads during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-831 - Launch facilities can cause or be jeopardized by structural loads during countdown to liftoff or abort. -- This hazard is the same as F-823. (3 29 88)

LRB-P-F-832 - Launch facilities can cause or be jeopardized by structural loads

during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-840 - Launch facilities can cause or be jeopardized by structural loads during refurbishment of reusable components. -- This hazard is not credible. (3 29 88)

LRB-P-F-847 - Launch facilities can cause or be jeopardized by leaks during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-851 - Launch facilities can cause or be jeopardized by leaks during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-852 - Launch facilities can cause or be jeopardized by leaks during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-853 - Launch facilities can cause or be jeopardized by leaks during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-854 - Launch facilities can cause or be jeopardized by leaks during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-855 - Launch facilities can cause or be jeopardized by leaks during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-856 - Launch facilities can cause or be jeopardized by leaks during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-864 - Launch facilities can cause or be jeopardized by leaks during refurbishment of reusable components. -- This hazard is not credible. (3 29 88)

LRB-P-F-871 - Launch facilities can cause or be jeopardized by propellant characteristics and products during flight readiness firing (FRF) of the STS vehicle. -- For a baseline RP-1/LOX vehicle, propellant characteristics are well known and easily dealth with. Therefore this hazard does not appear to be credible. (3 29 88)

LRB-P-F-875 - Launch facilities can cause or be jeopardized by propellant characteristics and products during preflight checkout prior to stacking. -- This hazard is not credible. (3 29 88)

LRB-P-F-876 - Launch facilities can cause or be jeopardized by propellant characteristics and products during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (3 29 88)

LRB-P-F-877 - Launch facilities can cause or be jeopardized by propellant characteristics and products during rollout from the VAB and preloading preparation. -- This hazard is not credible. (3 29 88)

LRB-P-F-878 - Launch facilities can cause or be jeopardized by propellant characteristics and products during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-879 - Launch facilities can cause or be jeopardized by propellant characteristics and products during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-880 - Launch facilities can cause or be jeopardized by propellant characteristics and products during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (3 29 88)

LRB-P-F-888 - Launch facilities can cause or be jeopardized by propellant characteristics and products during refurbishment of reusable components. -- This hazard is not credible. (3 29 88)

LRB-P-F-895 - Launch facilities can cause or be jeopardized by lightning or electromagnetic discharge during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-F-899 - Launch facilities can cause or be jeopardized by lightning or electromagnetic discharge during preflight checkout prior to stacking. -- This hazard is not credible. (3 30 88)

LRB-P-F-900 - Launch facilities can cause or be jeopardized by lightning or electromagnetic discharge during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (3 30 88)

LRB-P-F-901 - Launch facilities can cause or be jeopardized by lightning or electromagnetic discharge during rollout from the VAB and preloading preparation. -- This hazard is not credible. (3 30 88)

LRB-P-F-902 - Launch facilities can cause or be jeopardized by lightning or electromagnetic discharge during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-F-903 - Launch facilities can cause or be jeopardized by lightning or

electromagnetic discharge during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-F-904 - Launch facilities can cause or be jeopardized by lightning or electromagnetic discharge during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-F-912 - Launch facilities can cause or be jeopardized by lightning or electromagnetic discharge during refurbishment of reusable components. -- This hazard is not credible. (3 30 88)

LRB-P-F-919 - Launch facilities can cause or be jeopardized by faulty documentation during flight readiness firing (FRF) of the STS vehicle. -- A thorough review of all work documents will be required prior to the first FRF of the LRB. Obviously, errors in documentation can have serious safety consequences. At this stage of maturity of the LRB design definition, it is not possible precisely to determine where specific problems might be encountered. (3 30 88)

LRB-P-F-923 - Launch facilities can cause or be jeopardized by faulty documentation during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-F-924 - Launch facilities can cause or be jeopardized by faulty documentation during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-F-925 - Launch facilities can cause or be jeopardized by faulty documentation during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-F-926 - Launch facilities can cause or be jeopardized by faulty documentation during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-F-927 - Launch facilities can cause or be jeopardized by faulty documentation during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-F-928 - Launch facilities can cause or be jeopardized by faulty documentation during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-F-936 - Launch facilities can cause or be jeopardized by faulty documentation during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-F-947 - Launch facilities can cause or be jeopardized by chemical activity during preflight checkout prior to stacking. -- This hazard is not credible. (3 30 88)

LRB-P-F-948 - Launch facilities can cause or be jeopardized by chemical activity during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (3 30 88)

LRB-P-F-949 - Launch facilities can cause or be jeopardized by chemical activity during rollout from the VAB and preloading preparation. -- This hazard is not credible. (3 30 88)

LRB-P-F-950 - Launch facilities can cause or be jeopardized by chemical activity during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-F-951 - Launch facilities can cause or be jeopardized by chemical activity during countdown to liftoff or abort. -- This is essentially the same hazard as F-943. (3 30 88)

LRB-P-F-952 - Launch facilities can cause or be jeopardized by chemical activity during launch abort activities, including mission postponement (scrub). -- This is essentially the same hazard as F-943. (3 30 88)

LRB-P-F-960 - Launch facilities can cause or be jeopardized by chemical activity during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-F-967 - Launch facilities can cause or be jeopardized by computer system malfunction during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as E-967. (3 30 88)

LRB-P-F-971 - Launch facilities can cause or be jeopardized by computer system malfunction during preflight checkout prior to stacking. -- This hazard is analyzed as E-963 and E-1035. (3 30 88)

LRB-P-F-972 - Launch facilities can cause or be jeopardized by computer system malfunction during vehicle stacking, including ancillary test activities. -- This hazard is essentially the same as F-971. (3 30 88)

LRB-P-F-973 - Launch facilities can cause or be jeopardized by computer system malfunction during rollout from the VAB and preloading preparation. -- This hazard is analyzed as E-967. (3 30 88)

LRB-P-F-974 - Launch facilities can cause or be jeopardized by computer system malfunction during propellant loading for test or flight. -- This hazard is analyzed as E-967. (3 30 88)

LRB-P-F-975 - Launch facilities can cause or be jeopardized by computer system malfunction during countdown to liftoff or abort. -- This hazard is analyzed as E-967. (3 30 88)

LRB-P-F-976 - Launch facilities can cause or be jeopardized by computer system malfunction during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as E-967. (3 30 88)

LRB-P-F-984 - Launch facilities can cause or be jeopardized by computer system malfunction during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-F-991 - Launch facilities can cause or be jeopardized by operator error during flight readiness firing (FRF) of the STS vehicle. -- This hazard is essentially the same as F-559. (3 30 88)

LRB-P-F-995 - Launch facilities can cause or be jeopardized by operator error during preflight checkout prior to stacking. -- Although numerous opportunities exist for jeopardy to facilities, the launch vehicle and personnel during checkout, the present level of design maturity does not permit a precise analysis of the hazards involved at this time. (3 30 88)

LRB-P-F-996 - Launch facilities can cause or be jeopardized by operator error during vehicle stacking, including ancillary test activities. -- This is essentially the same hazard as that analyzed as F-588. (3 30 88)

LRB-P-F-997 - Launch facilities can cause or be jeopardized by operator error during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-F-998 - Launch facilities can cause or be jeopardized by operator error during propellant loading for test or flight. -- This hazard is analyzed as F-559. (3 30 88)

LRB-P-F-999 - Launch facilities can cause or be jeopardized by operator error during countdown to liftoff or abort. -- This hazard is analyzed as F-559. (3 30 88)

LRB-P-F-1000 - Launch facilities can cause or be jeopardized by operator error during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as F-559. (3 30 88)

LRB-P-F-1008 - Launch facilities can cause or be jeopardized by operator error during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-F-1043 - Launch facilities can cause or be jeopardized by emergencies

during preflight checkout prior to stacking. -- This hazard is analyzed in F-1039. (3 30 88)

LRB-P-F-1044 - Launch facilities can cause or be jeopardized by emergencies during vehicle stacking, including ancillary test activities. -- This hazard is analyzed in F-1039. (3 30 88)

LRB-P-F-1045 - Launch facilities can cause or be jeopardized by emergencies during rollout from the VAB and preloading preparation. -- This hazard is analyzed in F-1039. (3 30 88)

LRB-P-F-1046 - Launch facilities can cause or be jeopardized by emergencies during propellant loading for test or flight. -- This hazard is analyzed in F-1039. (3 30 88)

LRB-P-F-1047 - Launch facilities can cause or be jeopardized by emergencies during countdown to liftoff or abort. -- This hazard is analyzed in F-1039. (3 30 88)

LRB-P-F-1048 - Launch facilities can cause or be jeopardized by emergencies during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed in F-1039. (3 30 88)

LRB-P-F-1056 - Launch facilities can cause or be jeopardized by emergencies during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

THESE HAZARDS WERE CONSIDERED BY THE ANALYST BUT WERE NOT FURTHER ANALYZED FOR THE REASONS GIVEN

LRB-P-G-529 - LRB/Ground interfaces can cause or be jeopardized by hazardous environments during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (3 30 88)

LRB-P-G-530 - LRB/Ground interfaces can cause or be jeopardized by hazardous environments during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-G-533 - LRB/Ground interfaces can cause or be jeopardized by hazardous environments during acceptance test and checkout prior to delivery to the Government. -- Acceptance tests are likely to be walkdown and document inspections, therefore this hazard does not appear to be credible. (3 30 88)

LRB-P-G-534 - LRB/Ground interfaces can cause or be jeopardized by hazardous environments during test firing of engines and/or the completed booster. -- This hazard is analyzed as F-535. (3 30 88)

LRB-P-G-535 - LRB/Ground interfaces can cause or be jeopardized by hazardous environments during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as F-535. (3 30 88)

LRB-P-G-536 - LRB/Ground interfaces can cause or be jeopardized by hazardous environments during preparation for shipment of the booster and ship loose hardware. -- This hazard is not credible. (3 30 88)

LRB-P-G-537 - LRB/Ground interfaces can cause or be jeopardized by hazardous environments during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (3 30 88)

LRB-P-G-538 - LRB/Ground interfaces can cause or be jeopardized by hazardous environments during storage, including storage of major components. -- This hazard is not credible. (3 30 88)

LRB-P-G-539 - LRB/Ground interfaces can cause or be jeopardized by hazardous environments during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-G-540 - LRB/Ground interfaces can cause or be jeopardized by hazardous environments during vehicle stacking, including ancillary test activities. -- This hazard is analyzed as F-588. (3 30 88)

LRB-P-G-541 - LRB/Ground interfaces can cause or be jeopardized by hazardous environments during rollout from the VAB and preloading preparation. -- At the

current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-G-542 - LRB/Ground interfaces can cause or be jeopardized by hazardous environments during propellant loading for test or flight. -- The interfaces of interest here are umbilicals and holddown bolts. Since the environments experienced during these periods are likely to be those to which the launch pad and vehicle are designed, it is difficult to determine what hazards could arise other than component failure, which is analyzed in a FMEA. (3 30 88)

LRB-P-G-543 - LRB/Ground interfaces can cause or be jeopardized by hazardous environments during countdown to liftoff or abort. -- This hazard is analyzed as F-943. (3 30 88)

LRB-P-G-544 - LRB/Ground interfaces can cause or be jeopardized by hazardous environments during launch abort activities, including mission postponement (scrub). -- This is essentially the same hazard as G-543, which is analyzed as F-943. (3 30 88)

LRB-P-G-545 - LRB/Ground interfaces can cause or be jeopardized by hazardous environments during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (3 30 88)

LRB-P-G-546 - LRB/Ground interfaces can cause or be jeopardized by hazardous environments during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (3 30 88)

LRB-P-G-547 - LRB/Ground interfaces can cause or be jeopardized by hazardous environments during separation of the LRB from the STS vehicle. -- This hazard is not credible. (3 30 88)

LRB-P-G-551 - LRB/Ground interfaces can cause or be jeopardized by hazardous environments during recovery activities, including towing, and retrieval of recoverables. -- The interfaces of interest here are probably ships and/or helicopters. The level of design maturity at this point does not permit a precise evaluation of what hazards might be encountered as a consequence of recovery activities. (3 30 88)

LRB-P-G-552 - LRB/Ground interfaces can cause or be jeopardized by hazardous environments during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-G-553 - LRB/Ground interfaces can cause or be jeopardized by worker overload during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (3 30 88)

LRB-P-G-554 - LRB/Ground interfaces can cause or be jeopardized by worker overload during manufacture and fabrication of subsystems and components. -- At

the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-G-555 - LRB/Ground interfaces can cause or be jeopardized by worker overload during inspection and test of the LRB and subsystems. -- Worker overload may contribute to worker injury or flight hardware damage associated with the assembly or disassembly of work platforms, which is analyzed as hazard F-531. (3 30 88)

LRB-P-G-556 - LRB/Ground interfaces can cause or be jeopardized by worker overload during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-G-557 - LRB/Ground interfaces can cause or be jeopardized by worker overload during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-G-558 - LRB/Ground interfaces can cause or be jeopardized by worker overload during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-G-559 - LRB/Ground interfaces can cause or be jeopardized by worker overload during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as F-559. (3 30 88)

LRB-P-G-560 - LRB/Ground interfaces can cause or be jeopardized by worker overload during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-G-561 - LRB/Ground interfaces can cause or be jeopardized by worker overload during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-G-562 - LRB/Ground interfaces can cause or be jeopardized by worker overload during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-G-563 - LRB/Ground interfaces can cause or be jeopardized by worker overload during preflight checkout prior to stacking. -- This hazard is analyzed as F-531. (3 30 88)

LRB-P-G-564 - LRB/Ground interfaces can cause or be jeopardized by worker overload during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-G-565 - LRB/Ground interfaces can cause or be jeopardized by worker overload during rollout from the VAB and preloading preparation. -- At the current

state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-G-566 - LRB/Ground interfaces can cause or be jeopardized by worker overload during propellant loading for test or flight. -- This hazard is analyzed as F-559. (3 30 88)

LRB-P-G-567 - LRB/Ground interfaces can cause or be jeopardized by worker overload during countdown to liftoff or abort. -- This hazard is analyzed as F-559. (3 30 88)

LRB-P-G-568 - LRB/Ground interfaces can cause or be jeopardized by worker overload during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as hazard F-559 or F-1039. (3 30 88)

LRB-P-G-569 - LRB/Ground interfaces can cause or be jeopardized by worker overload during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (3 30 88)

LRB-P-G-570 - LRB/Ground interfaces can cause or be jeopardized by worker overload during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (3 30 88)

LRB-P-G-571 - LRB/Ground interfaces can cause or be jeopardized by worker overload during separation of the LRB from the STS vehicle. -- This hazard is not credible. (3 30 88)

LRB-P-G-575 - LRB/Ground interfaces can cause or be jeopardized by worker overload during recovery activities, including towing, and retrieval of recoverables. -- This hazard is associated with G-551. It cannot be precisely analyzed at the present time. (3 30 88)

LRB-P-G-576 - LRB/Ground interfaces can cause or be jeopardized by worker overload during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-G-577 - LRB/Ground interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (3 30 88)

LRB-P-G-578 - LRB/Ground interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during manufacture and fabrication of subsystems and components. -- This hazard is properly analyzed by a review of the industrial safety practices of the vehicle assembly contractor, and is beyond the scope of this analysis. (3 30 88)

LRB-P-G-579 - LRB/Ground interfaces can cause or be jeopardized by unsafe or

unhygienic working conditions during inspection and test of the LRB and subsystems. -- This hazard is associated with G-531 with respect to work platforms. (3 30 88)

LRB-P-G-580 - LRB/Ground interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during proof test of pressure vessels and structure. -- This hazard is analyzed as G-532. (3 30 88)

LRB-P-G-581 - LRB/Ground interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-G-582 - LRB/Ground interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-G-583 - LRB/Ground interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as F-559. (3 30 88)

LRB-P-G-584 - LRB/Ground interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-G-585 - LRB/Ground interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (3 30 88)

LRB-P-G-586 - LRB/Ground interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-G-587 - LRB/Ground interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during preflight checkout prior to stacking. -- This hazard is associated with G-531. (3 30 88)

LRB-P-G-588 - LRB/Ground interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during vehicle stacking, including ancillary test activities. -- This hazard is analyzed as F-558. (3 30 88)

LRB-P-G-589 - LRB/Ground interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-G-590 - LRB/Ground interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during propellant loading for test or flight. -- This hazard is analyzed as F-559. (3 30 88)

LRB-P-G-591 - LRB/Ground interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during countdown to liftoff or abort. -- This hazard is associated with F-559. (3 30 88)

LRB-P-G-592 - LRB/Ground interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-G-593 - LRB/Ground interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (3 30 88)

LRB-P-G-594 - LRB/Ground interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (3 30 88)

LRB-P-G-595 - LRB/Ground interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during separation of the LRB from the STS vehicle. -- This hazard is not credible. (3 30 88)

LRB-P-G-599 - LRB/Ground interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during recovery activities, including towing, and retrieval of recoverables. -- This hazard is associated with G-551. (3 30 88)

LRB-P-G-600 - LRB/Ground interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-G-625 - LRB/Ground interfaces can cause or be jeopardized by wind during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (3 30 88)

LRB-P-G-626 - LRB/Ground interfaces can cause or be jeopardized by wind during manufacture and fabrication of subsystems and components. -- This hazard is not credible. (3 30 88)

LRB-P-G-627 - LRB/Ground interfaces can cause or be jeopardized by wind during inspection and test of the LRB and subsystems. -- To the extent that wind will affect workers on the outside of the LRB in the stacked position, this hazard is analyzed as G-551. (3 30 88)

LRB-P-G-628 - LRB/Ground interfaces can cause or be jeopardized by wind during proof test of pressure vessels and structure. -- This hazard is not credible. (3 30 88)

LRB-P-G-629 - LRB/Ground interfaces can cause or be jeopardized by wind during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (3 30 88)

LRB-P-G-630 - LRB/Ground interfaces can cause or be jeopardized by wind during test firing of engines and/or the completed booster. -- Wind loading on the LRB and the effect of wind on the shape and intensity of the exhaust plume, this hazard is credible. However, without more information on the methods of test firing and the facilities to be used, this hazard is not amenable to analysis at this time. (3 30 88)

LRB-P-G-631 - LRB/Ground interfaces can cause or be jeopardized by wind during flight readiness firing (FRF) of the STS vehicle. -- High winds will affect the bending loads on the STS vehicle and the shape and thermal characteristics of the exhaust plume. It is assumed that these factors will be evaluated and that FRF will not take place when there is danger from wind. See also G-637. (3 30 88)

LRB-P-G-632 - LRB/Ground interfaces can cause or be jeopardized by wind during preparation for shipment of the booster and ship loose hardware. -- Without further information concerning what activities are involved in preparation for shipment, this hazard cannot be properly evaluated. (3 30 88)

LRB-P-G-633 - LRB/Ground interfaces can cause or be jeopardized by wind during transportation from manufacture to launch site or after recovery. -- The ground interface of interest here is the transporter. Since it is obvious that high winds could overturn the booster on the transporter, it is assumed that precautions will be taken not to transport the booster when there is danger from high winds. (3 30 88)

LRB-P-G-634 - LRB/Ground interfaces can cause or be jeopardized by wind during storage, including storage of major components. -- It is assumed that the vehicle will be protected from winds during storage. (3 30 88)

LRB-P-G-635 - LRB/Ground interfaces can cause or be jeopardized by wind during preflight checkout prior to stacking. -- Preflight checkout will be conducted in a protected structure, therefore the hazard from wind during this time is not assumed to be credible. (3 30 88)

LRB-P-G-636 - LRB/Ground interfaces can cause or be jeopardized by wind during vehicle stacking, including ancillary test activities. -- This hazard is associated with G-635; similar considerations apply. (3 30 88)

LRB-P-G-638 - LRB/Ground interfaces can cause or be jeopardized by wind during propellant loading for test or flight. -- This hazard is associated with G-637; similar considerations apply. (3 30 88)

LRB-P-G-639 - LRB/Ground interfaces can cause or be jeopardized by wind during countdown to liftoff or abort. -- This hazard is associated with G-637; similar considerations apply. (3 30 88)

LRB-P-G-640 - LRB/Ground interfaces can cause or be jeopardized by wind during launch abort activities, including mission postponement (scrub). -- This hazard is associated with G-637; similar considerations apply. (3 30 88)

LRB-P-G-641 - LRB/Ground interfaces can cause or be jeopardized by wind during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (3 30 88)

LRB-P-G-642 - LRB/Ground interfaces can cause or be jeopardized by wind during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (3 30 88)

LRB-P-G-643 - LRB/Ground interfaces can cause or be jeopardized by wind during separation of the LRB from the STS vehicle. -- This hazard is not credible. (3 30 88)

LRB-P-G-647 - LRB/Ground interfaces can cause or be jeopardized by wind during recovery activities, including towing, and retrieval of recoverables. -- This hazard has to do with recovery equipment and rough seas. Separation of electrical connections is analyzed as E-767. Other hazards are difficult to evaluate without a reasonably precise scenario for recovery operations. (3 30 88)

LRB-P-G-648 - LRB/Ground interfaces can cause or be jeopardized by wind during refurbishment of reusable components. -- This hazard is not credible. (3 30 88)

LRB-P-G-649 - LRB/Ground interfaces can cause or be jeopardized by contamination during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (3 30 88)

LRB-P-G-650 - LRB/Ground interfaces can cause or be jeopardized by contamination during manufacture and fabrication of subsystems and components. -- This hazard will be adequately controlled by a comprehensive and effective contamination control plan. (3 30 88)

LRB-P-G-651 - LRB/Ground interfaces can cause or be jeopardized by contamination during inspection and test of the LRB and subsystems. -- This hazard will be adequately controlled by a comprehensive and effective contamination control plan. (3 30 88)

LRB-P-G-652 - LRB/Ground interfaces can cause or be jeopardized by contamination during proof test of pressure vessels and structure. -- This hazard will be adequately controlled by a comprehensive and effective contamination control plan. (3 30 88)

LRB-P-G-653 - LRB/Ground interfaces can cause or be jeopardized by contamination during acceptance test and checkout prior to delivery to the Government. -- This hazard will be adequately controlled by a comprehensive and effective contamination control plan. (3 30 88)

LRB-P-G-654 - LRB/Ground interfaces can cause or be jeopardized by contamination during test firing of engines and/or the completed booster. -- This hazard will be adequately controlled by a comprehensive and effective contamination control plan. (3 30 88)

LRB-P-G-655 - LRB/Ground interfaces can cause or be jeopardized by contamination during flight readiness firing (FRF) of the STS vehicle. -- This hazard will be adequately controlled by a comprehensive and effective contamination control plan. (3 30 88)

LRB-P-G-656 - LRB/Ground interfaces can cause or be jeopardized by contamination during preparation for shipment of the booster and ship loose hardware. -- It is assumed that contamination will be controlled by the use of filtered breathers, positive pressure, or some other equally effective method. (3 30 88)

LRB-P-G-657 - LRB/Ground interfaces can cause or be jeopardized by contamination during transportation from manufacture to launch site or after recovery. -- This hazard will be adequately controlled by a comprehensive and effective contamination control plan. (3 30 88)

LRB-P-G-658 - LRB/Ground interfaces can cause or be jeopardized by contamination during storage, including storage of major components. -- This hazard will be adequately controlled by a comprehensive and effective contamination control plan. (3 30 88)

LRB-P-G-659 - LRB/Ground interfaces can cause or be jeopardized by contamination during preflight checkout prior to stacking. -- This hazard will be adequately controlled by a comprehensive and effective contamination control plan. (3 30 88)

LRB-P-G-660 - LRB/Ground interfaces can cause or be jeopardized by contamination during vehicle stacking, including ancillary test activities. -- This hazard will be adequately controlled by a comprehensive and effective contamination control plan. (3 30 88)

LRB-P-G-661 - LRB/Ground interfaces can cause or be jeopardized by contamination during rollout from the VAB and preloading preparation. -- This hazard will be adequately controlled by a comprehensive and effective contamination control plan. (3 30 88)

LRB-P-G-662 - LRB/Ground interfaces can cause or be jeopardized by

contamination during propellant loading for test or flight. -- This hazard will be adequately controlled by a comprehensive and effective contamination control plan. (3 30 88)

LRB-P-G-663 - LRB/Ground interfaces can cause or be jeopardized by contamination during countdown to liftoff or abort. -- This hazard will be adequately controlled by a comprehensive and effective contamination control plan. (3 30 88)

LRB-P-G-664 - LRB/Ground interfaces can cause or be jeopardized by contamination during launch abort activities, including mission postponement (scrub). -- This hazard will be adequately controlled by a comprehensive and effective contamination control plan. (3 30 88)

LRB-P-G-665 - LRB/Ground interfaces can cause or be jeopardized by contamination during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (3 30 88)

LRB-P-G-666 - LRB/Ground interfaces can cause or be jeopardized by contamination during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (3 30 88)

LRB-P-G-667 - LRB/Ground interfaces can cause or be jeopardized by contamination during separation of the LRB from the STS vehicle. -- This hazard is not credible. (3 30 88)

LRB-P-G-671 - LRB/Ground interfaces can cause or be jeopardized by contamination during recovery activities, including towing, and retrieval of recoverables. -- This hazard will be adequately controlled by a comprehensive and effective contamination control plan. (3 30 88)

LRB-P-G-672 - LRB/Ground interfaces can cause or be jeopardized by contamination during refurbishment of reusable components. -- This hazard will be adequately controlled by a comprehensive and effective contamination control plan. (3 30 88)

LRB-P-G-673 - LRB/Ground interfaces can cause or be jeopardized by heat sources during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (3 30 88)

LRB-P-G-674 - LRB/Ground interfaces can cause or be jeopardized by heat sources during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-G-675 - LRB/Ground interfaces can cause or be jeopardized by heat sources during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-G-676 - LRB/Ground interfaces can cause or be jeopardized by heat sources during proof test of pressure vessels and structure. -- This hazard is not credible. (3 30 88)

LRB-P-G-677 - LRB/Ground interfaces can cause or be jeopardized by heat sources during acceptance test and checkout prior to delivery to the Government. -- Acceptance testing is not likely to involve hazardous heat sources. (3 30 88)

LRB-P-G-678 - LRB/Ground interfaces can cause or be jeopardized by heat sources during test firing of engines and/or the completed booster. -- Test firing of the engines or the completed booster will be conducted in a facility specially designed for the purpose. Therefore, it can be assumed that heat loading will be adequately assessed and the proper precautions taken to prevent hazards from this source. (3 30 88)

LRB-P-G-679 - LRB/Ground interfaces can cause or be jeopardized by heat sources during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as F-535. G-688 also applies, except that the option exists during FRF to disconnect the holddown bolt pyrotechnics, thereby making it impossible for them to be fired unintentionally, as analyzed in G-688. (3 30 88)

LRB-P-G-680 - LRB/Ground interfaces can cause or be jeopardized by heat sources during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-G-681 - LRB/Ground interfaces can cause or be jeopardized by heat sources during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (3 30 88)

LRB-P-G-682 - LRB/Ground interfaces can cause or be jeopardized by heat sources during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-G-683 - LRB/Ground interfaces can cause or be jeopardized by heat sources during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-G-684 - LRB/Ground interfaces can cause or be jeopardized by heat sources during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-G-685 - LRB/Ground interfaces can cause or be jeopardized by heat sources during rollout from the VAB and preloading preparation. -- This hazard is not credible. (3 30 88)

LRB-P-G-686 - LRB/Ground interfaces can cause or be jeopardized by heat sources

during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-G-687 - LRB/Ground interfaces can cause or be jeopardized by heat sources during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-G-689 - LRB/Ground interfaces can cause or be jeopardized by heat sources during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (3 30 88)

LRB-P-G-690 - LRB/Ground interfaces can cause or be jeopardized by heat sources during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (3 30 88)

LRB-P-G-691 - LRB/Ground interfaces can cause or be jeopardized by heat sources during separation of the LRB from the STS vehicle. -- This hazard is not credible. (3 30 88)

LRB-P-G-695 - LRB/Ground interfaces can cause or be jeopardized by heat sources during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-G-696 - LRB/Ground interfaces can cause or be jeopardized by heat sources during refurbishment of reusable components. -- This hazard is not credible. (3 30 88)

LRB-P-G-745 - LRB/Ground interfaces can cause or be jeopardized by electrical system malfunction during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (3 30 88)

LRB-P-G-746 - LRB/Ground interfaces can cause or be jeopardized by electrical system malfunction during manufacture and fabrication of subsystems and components. -- This hazard is essentially the same as G-747; similar considerations apply. (3 30 88)

LRB-P-G-747 - LRB/Ground interfaces can cause or be jeopardized by electrical system malfunction during inspection and test of the LRB and subsystems. -- This hazard is analyzed as E-747 and E-891. (3 30 88)

LRB-P-G-749 - LRB/Ground interfaces can cause or be jeopardized by electrical system malfunction during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (3 30 88)

LRB-P-G-750 - LRB/Ground interfaces can cause or be jeopardized by electrical

system malfunction during test firing of engines and/or the completed booster. -- This hazard is analyzed as E-747. (3 30 88)

LRB-P-G-751 - LRB/Ground interfaces can cause or be jeopardized by electrical system malfunction during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as E-747. (3 30 88)

LRB-P-G-752 - LRB/Ground interfaces can cause or be jeopardized by electrical system malfunction during preparation for shipment of the booster and ship loose hardware. -- To the extent that it applies to preparations for shipment, this hazard is analyzed as E-747. Otherwise, this hazard is evaluated as G-753. (3 30 88)

LRB-P-G-754 - LRB/Ground interfaces can cause or be jeopardized by electrical system malfunction during storage, including storage of major components. -- If the electrical system controlling the storage environment fails, the booster could be subjected to hazardous environments. However, it is assumed that the vehicle can withstand a period of loss of environmental control during which time restoration functions can be accomplished. (3 31 88)

LRB-P-G-755 - LRB/Ground interfaces can cause or be jeopardized by electrical system malfunction during preflight checkout prior to stacking. -- This hazard is analyzed as E-747. (3 31 88)

LRB-P-G-756 - LRB/Ground interfaces can cause or be jeopardized by electrical system malfunction during vehicle stacking, including ancillary test activities. -- This hazard is analyzed as E-747. (3 31 88)

LRB-P-G-757 - LRB/Ground interfaces can cause or be jeopardized by electrical system malfunction during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (3 31 88)

LRB-P-G-758 - LRB/Ground interfaces can cause or be jeopardized by electrical system malfunction during propellant loading for test or flight. -- This hazard should be analyzed by a FMEA, which is not now feasible. (3 31 88)

LRB-P-G-760 - LRB/Ground interfaces can cause or be jeopardized by electrical system malfunction during launch abort activities, including mission postponement (scrub). -- To the extent that this hazard can be caused by failure of the pyrotechnic holddown bolts or umbilical separation bolt, this hazard is analyzed as G-759. (3 31 88)

LRB-P-G-761 - LRB/Ground interfaces can cause or be jeopardized by electrical system malfunction during nominal flight from liftoff to LRB burnout. -- To the extent that this hazard can be caused by failure of the pyrotechnic holddown bolts or umbilical separation bolt, this hazard is analyzed as G-759. (3 31 88)

LRB-P-G-762 - LRB/Ground interfaces can cause or be jeopardized by electrical system malfunction during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (3 31 88)

LRB-P-G-763 - LRB/Ground interfaces can cause or be jeopardized by electrical system malfunction during separation of the LRB from the STS vehicle. -- This hazard is not credible. (3 31 88)

LRB-P-G-767 - LRB/Ground interfaces can cause or be jeopardized by electrical system malfunction during recovery activities, including towing, and retrieval of recoverables. -- This hazard is analyzed as E-767. (3 31 88)

LRB-P-G-768 - LRB/Ground interfaces can cause or be jeopardized by electrical system malfunction during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (3 31 88)

LRB-P-G-769 - LRB/Ground interfaces can cause or be jeopardized by differential pressure during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (4 1 88)

LRB-P-G-770 - LRB/Ground interfaces can cause or be jeopardized by differential pressure during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-771 - LRB/Ground interfaces can cause or be jeopardized by differential pressure during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-772 - LRB/Ground interfaces can cause or be jeopardized by differential pressure during proof test of pressure vessels and structure. -- This hazard is analyzed as G-532. (4 1 88)

LRB-P-G-773 - LRB/Ground interfaces can cause or be jeopardized by differential pressure during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-775 - LRB/Ground interfaces can cause or be jeopardized by differential pressure during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as G-774. (4 1 88)

LRB-P-G-776 - LRB/Ground interfaces can cause or be jeopardized by differential pressure during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-777 - LRB/Ground interfaces can cause or be jeopardized by differential pressure during transportation from manufacture to launch site or after recovery. --

The ground interface of concern here is the tank breather system (if there is one). However, the structural strength of the propellant tanks, driven by the overriding stiffness design requirement, makes the propellant tanks immune to damage from pressure changes which might take place during transportation. (4 1 88)

LRB-P-G-778 - LRB/Ground interfaces can cause or be jeopardized by differential pressure during storage, including storage of major components. -- This hazard is not credible. (4 1 88)

LRB-P-G-779 - LRB/Ground interfaces can cause or be jeopardized by differential pressure during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-780 - LRB/Ground interfaces can cause or be jeopardized by differential pressure during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-781 - LRB/Ground interfaces can cause or be jeopardized by differential pressure during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-782 - LRB/Ground interfaces can cause or be jeopardized by differential pressure during propellant loading for test or flight. -- The obvious hazard is anomalous pressurization from the ground facility. This hazard requires a FMEA of the entire facility propellant delivery system, which is not feasible at this time. (4 1 88)

LRB-P-G-783 - LRB/Ground interfaces can cause or be jeopardized by differential pressure during countdown to liftoff or abort. -- This hazard is associated with G-782; similar considerations apply. (4 1 88)

LRB-P-G-784 - LRB/Ground interfaces can cause or be jeopardized by differential pressure during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-785 - LRB/Ground interfaces can cause or be jeopardized by differential pressure during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (4 1 88)

LRB-P-G-786 - LRB/Ground interfaces can cause or be jeopardized by differential pressure during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (4 1 88)

LRB-P-G-787 - LRB/Ground interfaces can cause or be jeopardized by differential pressure during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 1 88)

LRB-P-G-791 - LRB/Ground interfaces can cause or be jeopardized by differential pressure during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-792 - LRB/Ground interfaces can cause or be jeopardized by differential pressure during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-793 - LRB/Ground interfaces can cause or be jeopardized by vibration, acoustic loads or shock during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (4 1 88)

LRB-P-G-794 - LRB/Ground interfaces can cause or be jeopardized by vibration, acoustic loads or shock during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-795 - LRB/Ground interfaces can cause or be jeopardized by vibration, acoustic loads or shock during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-796 - LRB/Ground interfaces can cause or be jeopardized by vibration, acoustic loads or shock during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-797 - LRB/Ground interfaces can cause or be jeopardized by vibration, acoustic loads or shock during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-798 - LRB/Ground interfaces can cause or be jeopardized by vibration, acoustic loads or shock during test firing of engines and/or the completed booster. -- This hazard is analyzed as F-535. (4 1 88)

LRB-P-G-799 - LRB/Ground interfaces can cause or be jeopardized by vibration, acoustic loads or shock during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as F-535. (4 1 88)

LRB-P-G-800 - LRB/Ground interfaces can cause or be jeopardized by vibration, acoustic loads or shock during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-801 - LRB/Ground interfaces can cause or be jeopardized by vibration, acoustic loads or shock during transportation from manufacture to launch site or after recovery. -- The ground interface here is the transporter. However, without additional

system definition it is not possible to properly analyze this hazard. (4 1 88)

LRB-P-G-802 - LRB/Ground interfaces can cause or be jeopardized by vibration, acoustic loads or shock during storage, including storage of major components. -- This hazard is not credible. (4 1 88)

LRB-P-G-803 - LRB/Ground interfaces can cause or be jeopardized by vibration, acoustic loads or shock during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-804 - LRB/Ground interfaces can cause or be jeopardized by vibration, acoustic loads or shock during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-805 - LRB/Ground interfaces can cause or be jeopardized by vibration, acoustic loads or shock during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-807 - LRB/Ground interfaces can cause or be jeopardized by vibration, acoustic loads or shock during countdown to liftoff or abort. -- This hazard is analyzed as G-806. (4 1 88)

LRB-P-G-808 - LRB/Ground interfaces can cause or be jeopardized by vibration, acoustic loads or shock during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as G-806. (4 1 88)

LRB-P-G-809 - LRB/Ground interfaces can cause or be jeopardized by vibration, acoustic loads or shock during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (4 1 88)

LRB-P-G-810 - LRB/Ground interfaces can cause or be jeopardized by vibration, acoustic loads or shock during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (4 1 88)

LRB-P-G-811 - LRB/Ground interfaces can cause or be jeopardized by vibration, acoustic loads or shock during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 1 88)

LRB-P-G-815 - LRB/Ground interfaces can cause or be jeopardized by vibration, acoustic loads or shock during recovery activities, including towing, and retrieval of recoverables. -- It is anticipated that hazards will be encountered due to rough seas, ship motion, and other obvious hazards. The possibility of critical electrical connections severed by mechanical shock is covered by hazard E-767. (4 1 88)

LRB-P-G-816 - LRB/Ground interfaces can cause or be jeopardized by vibration, acoustic loads or shock during refurbishment of reusable components. -- At the

current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-817 - LRB/Ground interfaces can cause or be jeopardized by structural loads during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (4 1 88)

LRB-P-G-818 - LRB/Ground interfaces can cause or be jeopardized by structural loads during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-819 - LRB/Ground interfaces can cause or be jeopardized by structural loads during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-820 - LRB/Ground interfaces can cause or be jeopardized by structural loads during proof test of pressure vessels and structure. -- This hazard is analyzed as G-748. (4 1 88)

LRB-P-G-821 - LRB/Ground interfaces can cause or be jeopardized by structural loads during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (4 1 88)

LRB-P-G-822 - LRB/Ground interfaces can cause or be jeopardized by structural loads during test firing of engines and/or the completed booster. -- It is assumed that the facility will be capable of carrying the loads imposed. Since the LRB is designed for sustained thrust, there does not appear to be a hazard to the vehicle from this condition. (4 1 88)

LRB-P-G-824 - LRB/Ground interfaces can cause or be jeopardized by structural loads during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-825 - LRB/Ground interfaces can cause or be jeopardized by structural loads during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-826 - LRB/Ground interfaces can cause or be jeopardized by structural loads during storage, including storage of major components. -- This hazard is not credible. (4 1 88)

LRB-P-G-827 - LRB/Ground interfaces can cause or be jeopardized by structural loads during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-828 - LRB/Ground interfaces can cause or be jeopardized by structural loads during vehicle stacking, including ancillary test activities. -- At the current state

of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-829 - LRB/Ground interfaces can cause or be jeopardized by structural loads during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-830 - LRB/Ground interfaces can cause or be jeopardized by structural loads during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-831 - LRB/Ground interfaces can cause or be jeopardized by structural loads during countdown to liftoff or abort. -- This hazard is analyzed as G-823. (4 1 88)

LRB-P-G-832 - LRB/Ground interfaces can cause or be jeopardized by structural loads during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as G-823. (4 1 88)

LRB-P-G-833 - LRB/Ground interfaces can cause or be jeopardized by structural loads during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (4 1 88)

LRB-P-G-834 - LRB/Ground interfaces can cause or be jeopardized by structural loads during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (4 1 88)

LRB-P-G-835 - LRB/Ground interfaces can cause or be jeopardized by structural loads during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 1 88)

LRB-P-G-839 - LRB/Ground interfaces can cause or be jeopardized by structural loads during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-840 - LRB/Ground interfaces can cause or be jeopardized by structural loads during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-865 - LRB/Ground interfaces can cause or be jeopardized by propellant characteristics and products during component or material purchase, including acquisition of GFP. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-866 - LRB/Ground interfaces can cause or be jeopardized by propellant characteristics and products during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-867 - LRB/Ground interfaces can cause or be jeopardized by propellant characteristics and products during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-868 - LRB/Ground interfaces can cause or be jeopardized by propellant characteristics and products during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-869 - LRB/Ground interfaces can cause or be jeopardized by propellant characteristics and products during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (4 1 88)

LRB-P-G-870 - LRB/Ground interfaces can cause or be jeopardized by propellant characteristics and products during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-871 - LRB/Ground interfaces can cause or be jeopardized by propellant characteristics and products during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-872 - LRB/Ground interfaces can cause or be jeopardized by propellant characteristics and products during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-873 - LRB/Ground interfaces can cause or be jeopardized by propellant characteristics and products during transportation from manufacture to launch site or after recovery. -- Both LOX and RP-1 are now transported with a high degree of safety. (4 1 88)

LRB-P-G-874 - LRB/Ground interfaces can cause or be jeopardized by propellant characteristics and products during storage, including storage of major components. -- This hazard is not credible. (4 1 88)

LRB-P-G-875 - LRB/Ground interfaces can cause or be jeopardized by propellant characteristics and products during preflight checkout prior to stacking. -- This hazard is not credible. (4 1 88)

LRB-P-G-876 - LRB/Ground interfaces can cause or be jeopardized by propellant characteristics and products during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (4 1 88)

LRB-P-G-877 - LRB/Ground interfaces can cause or be jeopardized by propellant characteristics and products during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 1 88)

LRB-P-G-878 - LRB/Ground interfaces can cause or be jeopardized by propellant characteristics and products during propellant loading for test or flight. -- This hazard is analyzed as F-943. (4 1 88)

LRB-P-G-879 - LRB/Ground interfaces can cause or be jeopardized by propellant characteristics and products during countdown to liftoff or abort. -- LRB exhaust is likely to be less noxious than SRB exhaust. Also, hazards associated with LOX and RP-1 are well known. For these reasons, these propellants do not appear to present appreciable hazards. (4 1 88)

LRB-P-G-880 - LRB/Ground interfaces can cause or be jeopardized by propellant characteristics and products during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-881 - LRB/Ground interfaces can cause or be jeopardized by propellant characteristics and products during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (4 1 88)

LRB-P-G-882 - LRB/Ground interfaces can cause or be jeopardized by propellant characteristics and products during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (4 1 88)

LRB-P-G-883 - LRB/Ground interfaces can cause or be jeopardized by propellant characteristics and products during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 1 88)

LRB-P-G-887 - LRB/Ground interfaces can cause or be jeopardized by propellant characteristics and products during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-888 - LRB/Ground interfaces can cause or be jeopardized by propellant characteristics and products during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-889 - LRB/Ground interfaces can cause or be jeopardized by lightning or electromagnetic discharge during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (4 1 88)

LRB-P-G-890 - LRB/Ground interfaces can cause or be jeopardized by lightning or electromagnetic discharge during manufacture and fabrication of subsystems and components. -- A number of subsystems on the pad (such as the holddown bolt pyrotechnic initiation system) could be jeopardized by lightning. However, the associated hazards already exist and and controlled with respect to the SRB, and are not unique to the LRB system. Hazards associated with differences, if any, between

existing and new systems cannot be evaluated at this stage of design maturity. (4 1 88)

LRB-P-G-891 - LRB/Ground interfaces can cause or be jeopardized by lightning or electromagnetic discharge during inspection and test of the LRB and subsystems. -- This hazard is analyzed as E-891. (4 1 88)

LRB-P-G-892 - LRB/Ground interfaces can cause or be jeopardized by lightning or electromagnetic discharge during proof test of pressure vessels and structure. -- Hazards associated with damage to facilities control equipment are analyzed as G-748. (4 1 88)

LRB-P-G-893 - LRB/Ground interfaces can cause or be jeopardized by lightning or electromagnetic discharge during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-894 - LRB/Ground interfaces can cause or be jeopardized by lightning or electromagnetic discharge during test firing of engines and/or the completed booster. -- This hazard is analyzed as E-891 and E-747. (4 1 88)

LRB-P-G-895 - LRB/Ground interfaces can cause or be jeopardized by lightning or electromagnetic discharge during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as E-895. (4 1 88)

LRB-P-G-896 - LRB/Ground interfaces can cause or be jeopardized by lightning or electromagnetic discharge during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-897 - LRB/Ground interfaces can cause or be jeopardized by lightning or electromagnetic discharge during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-898 - LRB/Ground interfaces can cause or be jeopardized by lightning or electromagnetic discharge during storage, including storage of major components. -- This hazard is not credible. (4 1 88)

LRB-P-G-899 - LRB/Ground interfaces can cause or be jeopardized by lightning or electromagnetic discharge during preflight checkout prior to stacking. -- This hazard is not credible. (4 1 88)

LRB-P-G-900 - LRB/Ground interfaces can cause or be jeopardized by lightning or electromagnetic discharge during vehicle stacking, including ancillary test activities. -- This hazard is analyzed as E-891. (4 1 88)

LRB-P-G-901 - LRB/Ground interfaces can cause or be jeopardized by lightning or electromagnetic discharge during rollout from the VAB and preloading preparation. -- These hazard are already dealt with in current systems. They should be reexamined when the booster design is complete. (4 1 88)

LRB-P-G-902 - LRB/Ground interfaces can cause or be jeopardized by lightning or electromagnetic discharge during propellant loading for test or flight. -- Since the ET is loaded with propellants which are equally or (in the case of hydrogen) more susceptible to ignition by lightning, it may be assumed that this hazard will be adequately dealt with. (4 1 88)

LRB-P-G-903 - LRB/Ground interfaces can cause or be jeopardized by lightning or electromagnetic discharge during countdown to liftoff or abort. -- This hazard is analyzed as E-895. (4 1 88)

LRB-P-G-904 - LRB/Ground interfaces can cause or be jeopardized by lightning or electromagnetic discharge during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as E-895. (4 1 88)

LRB-P-G-905 - LRB/Ground interfaces can cause or be jeopardized by lightning or electromagnetic discharge during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (4 1 88)

LRB-P-G-906 - LRB/Ground interfaces can cause or be jeopardized by lightning or electromagnetic discharge during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (4 1 88)

LRB-P-G-907 - LRB/Ground interfaces can cause or be jeopardized by lightning or electromagnetic discharge during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 1 88)

LRB-P-G-911 - LRB/Ground interfaces can cause or be jeopardized by lightning or electromagnetic discharge during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-912 - LRB/Ground interfaces can cause or be jeopardized by lightning or electromagnetic discharge during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-937 - LRB/Ground interfaces can cause or be jeopardized by chemical activity during component or material purchase, including acquisition of GFP. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-938 - LRB/Ground interfaces can cause or be jeopardized by chemical activity during manufacture and fabrication of subsystems and components. -- At the

current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-939 - LRB/Ground interfaces can cause or be jeopardized by chemical activity during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-940 - LRB/Ground interfaces can cause or be jeopardized by chemical activity during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-941 - LRB/Ground interfaces can cause or be jeopardized by chemical activity during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-942 - LRB/Ground interfaces can cause or be jeopardized by chemical activity during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-943 - LRB/Ground interfaces can cause or be jeopardized by chemical activity during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-944 - LRB/Ground interfaces can cause or be jeopardized by chemical activity during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-945 - LRB/Ground interfaces can cause or be jeopardized by chemical activity during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-946 - LRB/Ground interfaces can cause or be jeopardized by chemical activity during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-947 - LRB/Ground interfaces can cause or be jeopardized by chemical activity during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-948 - LRB/Ground interfaces can cause or be jeopardized by chemical activity during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-949 - LRB/Ground interfaces can cause or be jeopardized by chemical activity during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-950 - LRB/Ground interfaces can cause or be jeopardized by chemical activity during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-951 - LRB/Ground interfaces can cause or be jeopardized by chemical activity during countdown to liftoff or abort. -- This hazard is evaluated as F-943. (4 1 88)

LRB-P-G-952 - LRB/Ground interfaces can cause or be jeopardized by chemical activity during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-953 - LRB/Ground interfaces can cause or be jeopardized by chemical activity during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (4 1 88)

LRB-P-G-954 - LRB/Ground interfaces can cause or be jeopardized by chemical activity during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (4 1 88)

LRB-P-G-955 - LRB/Ground interfaces can cause or be jeopardized by chemical activity during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 1 88)

LRB-P-G-959 - LRB/Ground interfaces can cause or be jeopardized by chemical activity during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-960 - LRB/Ground interfaces can cause or be jeopardized by chemical activity during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-961 - LRB/Ground interfaces can cause or be jeopardized by computer system malfunction during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (4 1 88)

LRB-P-G-962 - LRB/Ground interfaces can cause or be jeopardized by computer system malfunction during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-963 - LRB/Ground interfaces can cause or be jeopardized by computer system malfunction during inspection and test of the LRB and subsystems. -- This hazard is analyzed as E-963. See also hazard E-1035. (4 1 88)

LRB-P-G-964 - LRB/Ground interfaces can cause or be jeopardized by computer

system malfunction during proof test of pressure vessels and structure. -- This hazard is evaluated as G-748. (4 1 88)

LRB-P-G-965 - LRB/Ground interfaces can cause or be jeopardized by computer system malfunction during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-966 - LRB/Ground interfaces can cause or be jeopardized by computer system malfunction during test firing of engines and/or the completed booster. -- This hazard is analyzed as E-967. (4 1 88)

LRB-P-G-967 - LRB/Ground interfaces can cause or be jeopardized by computer system malfunction during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as E-967 (4 1 88)

LRB-P-G-968 - LRB/Ground interfaces can cause or be jeopardized by computer system malfunction during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-969 - LRB/Ground interfaces can cause or be jeopardized by computer system malfunction during transportation from manufacture to launch site or after recovery. -- This hazard is analyzed as G-753. (4 1 88)

LRB-P-G-970 - LRB/Ground interfaces can cause or be jeopardized by computer system malfunction during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-971 - LRB/Ground interfaces can cause or be jeopardized by computer system malfunction during preflight checkout prior to stacking. -- This hazard is analyzed as E-747. (4 1 88)

LRB-P-G-972 - LRB/Ground interfaces can cause or be jeopardized by computer system malfunction during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-973 - LRB/Ground interfaces can cause or be jeopardized by computer system malfunction during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-974 - LRB/Ground interfaces can cause or be jeopardized by computer system malfunction during propellant loading for test or flight. -- This hazard is analyzed as E-967. (4 1 88)

LRB-P-G-975 - LRB/Ground interfaces can cause or be jeopardized by computer

system malfunction during countdown to liftoff or abort. -- This hazard is analyzed as E-967. (4 1 88)

LRB-P-G-976 - LRB/Ground interfaces can cause or be jeopardized by computer system malfunction during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as E-967. (4 1 88)

LRB-P-G-977 - LRB/Ground interfaces can cause or be jeopardized by computer system malfunction during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (4 1 88)

LRB-P-G-978 - LRB/Ground interfaces can cause or be jeopardized by computer system malfunction during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (4 1 88)

LRB-P-G-979 - LRB/Ground interfaces can cause or be jeopardized by computer system malfunction during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 1 88)

LRB-P-G-983 - LRB/Ground interfaces can cause or be jeopardized by computer system malfunction during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-984 - LRB/Ground interfaces can cause or be jeopardized by computer system malfunction during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-985 - LRB/Ground interfaces can cause or be jeopardized by operator error during component or material purchase, including acquisition of GFP. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-986 - LRB/Ground interfaces can cause or be jeopardized by operator error during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-987 - LRB/Ground interfaces can cause or be jeopardized by operator error during inspection and test of the LRB and subsystems. -- This hazard is analyzed as F-559. (4 1 88)

LRB-P-G-989 - LRB/Ground interfaces can cause or be jeopardized by operator error during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-990 - LRB/Ground interfaces can cause or be jeopardized by operator error during test firing of engines and/or the completed booster. -- Although the

potential for damage due to operator error is obvious, the specific consequences of each error cannot be evaluated at present. (4 1 88)

LRB-P-G-992 - LRB/Ground interfaces can cause or be jeopardized by operator error during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-993 - LRB/Ground interfaces can cause or be jeopardized by operator error during transportation from manufacture to launch site or after recovery. -- Obvious hazards due to operator error involve operation of transporters. At present, it is not possible to identify what hazards might be unique to the transportation of the LRB or how they might be avoided. (4 1 88)

LRB-P-G-994 - LRB/Ground interfaces can cause or be jeopardized by operator error during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-995 - LRB/Ground interfaces can cause or be jeopardized by operator error during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-996 - LRB/Ground interfaces can cause or be jeopardized by operator error during vehicle stacking, including ancillary test activities. -- Possible sources of error unique to the LRB is in vehicle erection, which is analyzed in hazard F-588. (4 1 88)

LRB-P-G-997 - LRB/Ground interfaces can cause or be jeopardized by operator error during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 1 88)

LRB-P-G-998 - LRB/Ground interfaces can cause or be jeopardized by operator error during propellant loading for test or flight. -- This hazard is analyzed as F-559. (4 2 88)

LRB-P-G-999 - LRB/Ground interfaces can cause or be jeopardized by operator error during countdown to liftoff or abort. -- This hazard is analyzed as F-559. (4 2 88)

LRB-P-G-1000 - LRB/Ground interfaces can cause or be jeopardized by operator error during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as F-599. (4 2 88)

LRB-P-G-1001 - LRB/Ground interfaces can cause or be jeopardized by operator error during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (4 2 88)

LRB-P-G-1002 - LRB/Ground interfaces can cause or be jeopardized by operator error during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (4 2 88)

LRB-P-G-1003 - LRB/Ground interfaces can cause or be jeopardized by operator error during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 2 88)

LRB-P-G-1007 - LRB/Ground interfaces can cause or be jeopardized by operator error during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-G-1008 - LRB/Ground interfaces can cause or be jeopardized by operator error during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-G-1033 - LRB/Ground interfaces can cause or be jeopardized by emergencies during component or material purchase, including acquisition of GFP. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-G-1034 - LRB/Ground interfaces can cause or be jeopardized by emergencies during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-G-1035 - LRB/Ground interfaces can cause or be jeopardized by emergencies during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-G-1036 - LRB/Ground interfaces can cause or be jeopardized by emergencies during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-G-1037 - LRB/Ground interfaces can cause or be jeopardized by emergencies during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-G-1038 - LRB/Ground interfaces can cause or be jeopardized by emergencies during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-G-1039 - LRB/Ground interfaces can cause or be jeopardized by emergencies during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as F-1039. (4 2 88)

LRB-P-G-1040 - LRB/Ground interfaces can cause or be jeopardized by

emergencies during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-G-1041 - LRB/Ground interfaces can cause or be jeopardized by emergencies during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-G-1042 - LRB/Ground interfaces can cause or be jeopardized by emergencies during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-G-1043 - LRB/Ground interfaces can cause or be jeopardized by emergencies during preflight checkout prior to stacking. -- Emergencies during this period are in the nature of industrial accidents. Prior to first use of LRBs, it will be necessary to do a complete review of the current industrial safety plan and procedures to insure that industrial accidents are prevented wherever possible. (4 2 88)

LRB-P-G-1044 - LRB/Ground interfaces can cause or be jeopardized by emergencies during vehicle stacking, including ancillary test activities. -- See hazard G-1043. (4 2 88)

LRB-P-G-1045 - LRB/Ground interfaces can cause or be jeopardized by emergencies during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-G-1046 - LRB/Ground interfaces can cause or be jeopardized by emergencies during propellant loading for test or flight. -- This hazard is analyzed as F-1039. (4 2 88)

LRB-P-G-1047 - LRB/Ground interfaces can cause or be jeopardized by emergencies during countdown to liftoff or abort. -- This hazard is analyzed as F-1039. (4 2 88)

LRB-P-G-1048 - LRB/Ground interfaces can cause or be jeopardized by emergencies during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as F-1039. (4 2 88)

LRB-P-G-1049 - LRB/Ground interfaces can cause or be jeopardized by emergencies during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (4 2 88)

LRB-P-G-1050 - LRB/Ground interfaces can cause or be jeopardized by emergencies during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (4 2 88)

LRB-P-G-1051 - LRB/Ground interfaces can cause or be jeopardized by emergencies during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 2 88)

LRB-P-G-1055 - LRB/Ground interfaces can cause or be jeopardized by emergencies during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-G-1056 - LRB/Ground interfaces can cause or be jeopardized by emergencies during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

THESE HAZARDS WERE CONSIDERED BY THE ANALYST BUT WERE NOT FURTHER ANALYZED FOR THE REASONS GIVEN

LRB-P-H-529 - The LRB hazardous gas detection system can cause or be jeopardized by hazardous environments during component or material purchase, including acquisition of GFP. -- As an analytical instrument, the HGDS is vulnerable to many types of mishaps which might occur during purchase, transportation or storage of the instrument itself. The hazards to be investigated in these analyses are those which jeopardize or can be caused by that portion of the system which is contained within the vehicle or its umbilicals. (4 2 88)

LRB-P-H-530 - The LRB hazardous gas detection system can cause or be jeopardized by hazardous environments during manufacture and fabrication of subsystems and components. -- This hazard does not appear credible for the launch vehicle. See hazard # H-529. (4 2 88)

LRB-P-H-532 - The LRB hazardous gas detection system can cause or be jeopardized by hazardous environments during proof test of pressure vessels and structure. -- This hazard refers to proof test of the HGDS. The range of hazardous environments to which components might be subject during proof test is sufficiently diverse that a precise analysis at this time is not possible. (4 2 88)

LRB-P-H-533 - The LRB hazardous gas detection system can cause or be jeopardized by hazardous environments during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-H-534 - The LRB hazardous gas detection system can cause or be jeopardized by hazardous environments during test firing of engines and/or the completed booster. -- If the HGDS is used at this time, it would be expected to be operational. Therefore, the hazardous environments associated with test firing would be those, among others, for which the system was designed. Analysis of hazards arising at this time is therefore essentially a FMEA, which is premature at this time. (4 2 88)

LRB-P-H-535 - The LRB hazardous gas detection system can cause or be jeopardized by hazardous environments during flight readiness firing (FRF) of the STS vehicle. -- During FRF, it is assumed that compartments will be purged to minimize the effects of leaks. In such a situation, hazards to the HGDS do not appear credible. (4 2 88)

LRB-P-H-536 - The LRB hazardous gas detection system can cause or be jeopardized by hazardous environments during preparation for shipment of the booster and ship loose hardware. -- This hazard does not appear credible for the launch vehicle. See hazard # H-529. (4 2 88)

LRB-P-H-537 - The LRB hazardous gas detection system can cause or be jeopardized by hazardous environments during transportation from manufacture to launch site or after recovery. -- This hazard does not appear credible for the launch vehicle. See hazard # H-529. (4 2 88)

LRB-P-H-538 - The LRB hazardous gas detection system can cause or be jeopardized by hazardous environments during storage, including storage of major components. -- This hazard does not appear credible for the launch vehicle. See hazard # H-529. (4 2 88)

LRB-P-H-539 - The LRB hazardous gas detection system can cause or be jeopardized by hazardous environments during preflight checkout prior to stacking. -- This hazard does not appear credible for the launch vehicle. See hazard # H-529. (4 2 88)

LRB-P-H-540 - The LRB hazardous gas detection system can cause or be jeopardized by hazardous environments during vehicle stacking, including ancillary test activities. -- This hazard does not appear credible for the launch vehicle. See hazard # H-529. (4 2 88)

LRB-P-H-541 - The LRB hazardous gas detection system can cause or be jeopardized by hazardous environments during rollout from the VAB and preloading preparation. -- This hazard does not appear credible for the launch vehicle. See hazard # H-529. (4 2 88)

LRB-P-H-542 - The LRB hazardous gas detection system can cause or be jeopardized by hazardous environments during propellant loading for test or flight. -- This hazard does not appear credible for the launch vehicle. See hazard # H-529. (4 2 88)

LRB-P-H-543 - The LRB hazardous gas detection system can cause or be jeopardized by hazardous environments during countdown to liftoff or abort. -- This is the design condition. Hazards at this time, if any, may be identified during an FMEA. (4 2 88)

LRB-P-H-544 - The LRB hazardous gas detection system can cause or be jeopardized by hazardous environments during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-H-545 - The LRB hazardous gas detection system can cause or be jeopardized by hazardous environments during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (4 2 88)

LRB-P-H-547 - The LRB hazardous gas detection system can cause or be jeopardized by hazardous environments during separation of the LRB from the STS

vehicle. -- This hazard is not credible. (4 2 88)

LRB-P-H-548 - The LRB hazardous gas detection system can cause or be jeopardized by hazardous environments during descent from separation to ocean impact. -- This hazard is not credible. (4 2 88)

LRB-P-H-549 - The LRB hazardous gas detection system can cause or be jeopardized by hazardous environments during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-H-550 - The LRB hazardous gas detection system can cause or be jeopardized by hazardous environments during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-H-551 - The LRB hazardous gas detection system can cause or be jeopardized by hazardous environments during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-H-552 - The LRB hazardous gas detection system can cause or be jeopardized by hazardous environments during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-H-553 - The LRB hazardous gas detection system can cause or be jeopardized by worker overload during component or material purchase, including acquisition of GFP. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-H-554 - The LRB hazardous gas detection system can cause or be jeopardized by worker overload during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-H-555 - The LRB hazardous gas detection system can cause or be jeopardized by worker overload during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-H-556 - The LRB hazardous gas detection system can cause or be jeopardized by worker overload during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-H-557 - The LRB hazardous gas detection system can cause or be

jeopardized by worker overload during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-H-558 - The LRB hazardous gas detection system can cause or be jeopardized by worker overload during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-H-560 - The LRB hazardous gas detection system can cause or be jeopardized by worker overload during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-H-561 - The LRB hazardous gas detection system can cause or be jeopardized by worker overload during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (4 2 88)

LRB-P-H-562 - The LRB hazardous gas detection system can cause or be jeopardized by worker overload during storage, including storage of major components. -- This hazard does not appear credible for the launch vehicle. See hazard # H-529. (4 2 88)

LRB-P-H-563 - The LRB hazardous gas detection system can cause or be jeopardized by worker overload during preflight checkout prior to stacking. -- This hazard does not appear credible for the launch vehicle. See hazard # H-529. (4 2 88)

LRB-P-H-564 - The LRB hazardous gas detection system can cause or be jeopardized by worker overload during vehicle stacking, including ancillary test activities. -- This hazard does not appear credible for the launch vehicle. See hazard # H-529. (4 2 88)

LRB-P-H-565 - The LRB hazardous gas detection system can cause or be jeopardized by worker overload during rollout from the VAB and preloading preparation. -- This hazard does not appear credible for the launch vehicle. See hazard # H-529. (4 2 88)

LRB-P-H-566 - The LRB hazardous gas detection system can cause or be jeopardized by worker overload during propellant loading for test or flight. -- This hazard is analyzed as H-559. (4 2 88)

LRB-P-H-567 - The LRB hazardous gas detection system can cause or be jeopardized by worker overload during countdown to liftoff or abort. -- This hazard is analyzed as H-559. (4 2 88)

LRB-P-H-568 - The LRB hazardous gas detection system can cause or be

jeopardized by worker overload during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as H-559. (4 2 88)

LRB-P-H-569 - The LRB hazardous gas detection system can cause or be jeopardized by worker overload during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (4 2 88)

LRB-P-H-570 - The LRB hazardous gas detection system can cause or be jeopardized by worker overload during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (4 2 88)

LRB-P-H-571 - The LRB hazardous gas detection system can cause or be jeopardized by worker overload during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 2 88)

LRB-P-H-572 - The LRB hazardous gas detection system can cause or be jeopardized by worker overload during descent from separation to ocean impact. -- This hazard is not credible. (4 2 88)

LRB-P-H-573 - The LRB hazardous gas detection system can cause or be jeopardized by worker overload during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-H-574 - The LRB hazardous gas detection system can cause or be jeopardized by worker overload during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-H-575 - The LRB hazardous gas detection system can cause or be jeopardized by worker overload during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-H-576 - The LRB hazardous gas detection system can cause or be jeopardized by worker overload during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-H-577 - The LRB hazardous gas detection system can cause or be jeopardized by unsafe or unhygienic working conditions during component or material purchase, including acquisition of GFP. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-H-578 - The LRB hazardous gas detection system can cause or be jeopardized by unsafe or unhygienic working conditions during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-H-579 - The LRB hazardous gas detection system can cause or be jeopardized by unsafe or unhygienic working conditions during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-H-580 - The LRB hazardous gas detection system can cause or be jeopardized by unsafe or unhygienic working conditions during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-H-581 - The LRB hazardous gas detection system can cause or be jeopardized by unsafe or unhygienic working conditions during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-H-582 - The LRB hazardous gas detection system can cause or be jeopardized by unsafe or unhygienic working conditions during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-H-583 - The LRB hazardous gas detection system can cause or be jeopardized by unsafe or unhygienic working conditions during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-H-584 - The LRB hazardous gas detection system can cause or be jeopardized by unsafe or unhygienic working conditions during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-H-585 - The LRB hazardous gas detection system can cause or be jeopardized by unsafe or unhygienic working conditions during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-H-586 - The LRB hazardous gas detection system can cause or be jeopardized by unsafe or unhygienic working conditions during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-H-587 - The LRB hazardous gas detection system can cause or be jeopardized by unsafe or unhygienic working conditions during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-H-588 - The LRB hazardous gas detection system can cause or be

jeopardized by unsafe or unhygienic working conditions during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-H-589 - The LRB hazardous gas detection system can cause or be jeopardized by unsafe or unhygienic working conditions during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-H-590 - The LRB hazardous gas detection system can cause or be jeopardized by unsafe or unhygienic working conditions during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-H-591 - The LRB hazardous gas detection system can cause or be jeopardized by unsafe or unhygienic working conditions during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-H-592 - The LRB hazardous gas detection system can cause or be jeopardized by unsafe or unhygienic working conditions during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-H-593 - The LRB hazardous gas detection system can cause or be jeopardized by unsafe or unhygienic working conditions during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (4 2 88)

LRB-P-H-594 - The LRB hazardous gas detection system can cause or be jeopardized by unsafe or unhygienic working conditions during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (4 2 88)

LRB-P-H-595 - The LRB hazardous gas detection system can cause or be jeopardized by unsafe or unhygienic working conditions during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 2 88)

LRB-P-H-596 - The LRB hazardous gas detection system can cause or be jeopardized by unsafe or unhygienic working conditions during descent from separation to ocean impact. -- This hazard is not credible. (4 2 88)

LRB-P-H-597 - The LRB hazardous gas detection system can cause or be jeopardized by unsafe or unhygienic working conditions during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-H-598 - The LRB hazardous gas detection system can cause or be jeopardized by unsafe or unhygienic working conditions during floatation (of

recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-H-599 - The LRB hazardous gas detection system can cause or be jeopardized by unsafe or unhygienic working conditions during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-H-600 - The LRB hazardous gas detection system can cause or be jeopardized by unsafe or unhygienic working conditions during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 2 88)

LRB-P-H-649 - The LRB hazardous gas detection system can cause or be jeopardized by contamination during component or material purchase, including acquisition of GFP. -- This hazard is analyzed as H-531. (4 4 88)

LRB-P-H-650 - The LRB hazardous gas detection system can cause or be jeopardized by contamination during manufacture and fabrication of subsystems and components. -- This hazard is analyzed as H-531. (4 4 88)

LRB-P-H-651 - The LRB hazardous gas detection system can cause or be jeopardized by contamination during inspection and test of the LRB and subsystems. -- This hazard is analyzed as H-531. (4 4 88)

LRB-P-H-652 - The LRB hazardous gas detection system can cause or be jeopardized by contamination during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-653 - The LRB hazardous gas detection system can cause or be jeopardized by contamination during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-654 - The LRB hazardous gas detection system can cause or be jeopardized by contamination during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-655 - The LRB hazardous gas detection system can cause or be jeopardized by contamination during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-656 - The LRB hazardous gas detection system can cause or be jeopardized by contamination during preparation for shipment of the booster and ship loose hardware. -- This hazard is analyzed as H-531. (4 4 88)

LRB-P-H-657 - The LRB hazardous gas detection system can cause or be jeopardized by contamination during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-658 - The LRB hazardous gas detection system can cause or be jeopardized by contamination during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-659 - The LRB hazardous gas detection system can cause or be jeopardized by contamination during preflight checkout prior to stacking. -- This hazard is analyzed as H-531. (4 4 88)

LRB-P-H-660 - The LRB hazardous gas detection system can cause or be jeopardized by contamination during vehicle stacking, including ancillary test activities. -- This hazard is analyzed as H-531. (4 4 88)

LRB-P-H-661 - The LRB hazardous gas detection system can cause or be jeopardized by contamination during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-662 - The LRB hazardous gas detection system can cause or be jeopardized by contamination during propellant loading for test or flight. -- Since this is the condition for which the HGDS is designed, it does not appear that there are credible hazards related to this cause. (4 4 88)

LRB-P-H-663 - The LRB hazardous gas detection system can cause or be jeopardized by contamination during countdown to liftoff or abort. -- This is the same hazard as H-662; similar considerations apply. (4 4 88)

LRB-P-H-664 - The LRB hazardous gas detection system can cause or be jeopardized by contamination during launch abort activities, including mission postponement (scrub). -- This is the same hazard as H-662. (4 4 88)

LRB-P-H-665 - The LRB hazardous gas detection system can cause or be jeopardized by contamination during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-666 - The LRB hazardous gas detection system can cause or be jeopardized by contamination during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-667 - The LRB hazardous gas detection system can cause or be jeopardized by contamination during separation of the LRB from the STS vehicle. --

At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-668 - The LRB hazardous gas detection system can cause or be jeopardized by contamination during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-669 - The LRB hazardous gas detection system can cause or be jeopardized by contamination during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-670 - The LRB hazardous gas detection system can cause or be jeopardized by contamination during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-671 - The LRB hazardous gas detection system can cause or be jeopardized by contamination during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-672 - The LRB hazardous gas detection system can cause or be jeopardized by contamination during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-673 - The LRB hazardous gas detection system can cause or be jeopardized by heat sources during component or material purchase, including acquisition of GFP. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-674 - The LRB hazardous gas detection system can cause or be jeopardized by heat sources during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-675 - The LRB hazardous gas detection system can cause or be jeopardized by heat sources during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-676 - The LRB hazardous gas detection system can cause or be jeopardized by heat sources during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-677 - The LRB hazardous gas detection system can cause or be jeopardized by heat sources during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-678 - The LRB hazardous gas detection system can cause or be jeopardized by heat sources during test firing of engines and/or the completed booster. -- Although it is obvious that test firing will involve heat sources, it is not obvious at this time how these sources could jeopardize the vehicle HGDS. (4 4 88)

LRB-P-H-679 - The LRB hazardous gas detection system can cause or be jeopardized by heat sources during flight readiness firing (FRF) of the STS vehicle. -- The same comments apply as in H-678. (4 4 88)

LRB-P-H-680 - The LRB hazardous gas detection system can cause or be jeopardized by heat sources during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-681 - The LRB hazardous gas detection system can cause or be jeopardized by heat sources during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-682 - The LRB hazardous gas detection system can cause or be jeopardized by heat sources during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-683 - The LRB hazardous gas detection system can cause or be jeopardized by heat sources during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-684 - The LRB hazardous gas detection system can cause or be jeopardized by heat sources during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-685 - The LRB hazardous gas detection system can cause or be jeopardized by heat sources during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-686 - The LRB hazardous gas detection system can cause or be jeopardized by heat sources during propellant loading for test or flight. -- This hazard is analyzed as H-734. See also H-750. (4 20 88)

LRB-P-H-687 - The LRB hazardous gas detection system can cause or be jeopardized by heat sources during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-688 - The LRB hazardous gas detection system can cause or be jeopardized by heat sources during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-689 - The LRB hazardous gas detection system can cause or be jeopardized by heat sources during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-690 - The LRB hazardous gas detection system can cause or be jeopardized by heat sources during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-691 - The LRB hazardous gas detection system can cause or be jeopardized by heat sources during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-692 - The LRB hazardous gas detection system can cause or be jeopardized by heat sources during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-693 - The LRB hazardous gas detection system can cause or be jeopardized by heat sources during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-694 - The LRB hazardous gas detection system can cause or be jeopardized by heat sources during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-695 - The LRB hazardous gas detection system can cause or be jeopardized by heat sources during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-696 - The LRB hazardous gas detection system can cause or be jeopardized by heat sources during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-721 - The LRB hazardous gas detection system can cause or be jeopardized by moisture or precipitation during component or material purchase, including acquisition of GFP. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-722 - The LRB hazardous gas detection system can cause or be jeopardized by moisture or precipitation during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-7 - The LRB hazardous gas detection system can cause or be jeopardized by moisture or precipitation during inspection and test of the LRB and

subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-724 - The LRB hazardous gas detection system can cause or be jeopardized by moisture or precipitation during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-725 - The LRB hazardous gas detection system can cause or be jeopardized by moisture or precipitation during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (4 4 88)

LRB-P-H-726 - The LRB hazardous gas detection system can cause or be jeopardized by moisture or precipitation during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-727 - The LRB hazardous gas detection system can cause or be jeopardized by moisture or precipitation during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-728 - The LRB hazardous gas detection system can cause or be jeopardized by moisture or precipitation during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-729 - The LRB hazardous gas detection system can cause or be jeopardized by moisture or precipitation during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-730 - The LRB hazardous gas detection system can cause or be jeopardized by moisture or precipitation during storage, including storage of major components. -- This hazard is not credible. (4 4 88)

LRB-P-H-731 - The LRB hazardous gas detection system can cause or be jeopardized by moisture or precipitation during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-732 - The LRB hazardous gas detection system can cause or be jeopardized by moisture or precipitation during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-733 - The LRB hazardous gas detection system can cause or be jeopardized by moisture or precipitation during rollout from the VAB and preloading

preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-735 - The LRB hazardous gas detection system can cause or be jeopardized by moisture or precipitation during countdown to liftoff or abort. -- This hazard is analyzed as H-734. (4 4 88)

LRB-P-H-736 - The LRB hazardous gas detection system can cause or be jeopardized by moisture or precipitation during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as H-734. (4 4 88)

LRB-P-H-737 - The LRB hazardous gas detection system can cause or be jeopardized by moisture or precipitation during nominal flight from liftoff to LRB burnout. -- Although moisture ingestion is possible at this time, it is not obvious how this might constitute a hazard. (4 4 88)

LRB-P-H-738 - The LRB hazardous gas detection system can cause or be jeopardized by moisture or precipitation during intact abort, including RTLS, TAL, AOA and ATO. -- The same comments apply as in H-737. (4 4 88)

LRB-P-H-739 - The LRB hazardous gas detection system can cause or be jeopardized by moisture or precipitation during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-740 - The LRB hazardous gas detection system can cause or be jeopardized by moisture or precipitation during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-741 - The LRB hazardous gas detection system can cause or be jeopardized by moisture or precipitation during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-742 - The LRB hazardous gas detection system can cause or be jeopardized by moisture or precipitation during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-743 - The LRB hazardous gas detection system can cause or be jeopardized by moisture or precipitation during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-744 - The LRB hazardous gas detection system can cause or be jeopardized by moisture or precipitation during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-745 - The LRB hazardous gas detection system can cause or be jeopardized by electrical system malfunction during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (4 4 88)

LRB-P-H-746 - The LRB hazardous gas detection system can cause or be jeopardized by electrical system malfunction during manufacture and fabrication of subsystems and components. -- This hazard is analyzed as E-747 and E-891. (4 4 88)

LRB-P-H-747 - The LRB hazardous gas detection system can cause or be jeopardized by electrical system malfunction during inspection and test of the LRB and subsystems. -- This hazard is analyzed as E-747 and E-891. (4 4 88)

LRB-P-H-748 - The LRB hazardous gas detection system can cause or be jeopardized by electrical system malfunction during proof test of pressure vessels and structure. -- To the extent that it applies, this hazard is analyzed as G-748. (4 4 88)

LRB-P-H-749 - The LRB hazardous gas detection system can cause or be jeopardized by electrical system malfunction during acceptance test and checkout prior to delivery to the Government. -- This hazard is analyzed as E-747 and E-891. (4 4 88)

LRB-P-H-751 - The LRB hazardous gas detection system can cause or be jeopardized by electrical system malfunction during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as H-750 for electric heaters on the manifold. Hazards associated with electrical failure involving instrumentation power in the launch facility are not peculiar to the LRB and are not amenable to analysis within the scope of this PHA. (4 4 88)

LRB-P-H-752 - The LRB hazardous gas detection system can cause or be jeopardized by electrical system malfunction during preparation for shipment of the booster and ship loose hardware. -- This hazard is analyzed as E-747 and E-891. (4 4 88)

LRB-P-H-753 - The LRB hazardous gas detection system can cause or be jeopardized by electrical system malfunction during transportation from manufacture to launch site or after recovery. -- This hazard is analyzed as G-753. (4 4 88)

LRB-P-H-754 - The LRB hazardous gas detection system can cause or be jeopardized by electrical system malfunction during storage, including storage of major components. -- This hazard is essentially the same as G-753. (4 4 88)

LRB-P-H-755 - The LRB hazardous gas detection system can cause or be jeopardized by electrical system malfunction during preflight checkout prior to stacking. -- This hazard is analyzed as E-747 and E-891. (4 4 88)

LRB-P-H-756 - The LRB hazardous gas detection system can cause or be jeopardized by electrical system malfunction during vehicle stacking, including ancillary test activities. -- This hazard is analyzed as E-747 and E-891. (4 4 88)

LRB-P-H-757 - The LRB hazardous gas detection system can cause or be jeopardized by electrical system malfunction during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-758 - The LRB hazardous gas detection system can cause or be jeopardized by electrical system malfunction during propellant loading for test or flight. -- This hazard is analyzed as H-750. (4 4 88)

LRB-P-H-759 - The LRB hazardous gas detection system can cause or be jeopardized by electrical system malfunction during countdown to liftoff or abort. -- This hazard is analyzed as H-750. (4 4 88)

LRB-P-H-760 - The LRB hazardous gas detection system can cause or be jeopardized by electrical system malfunction during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as H-750. (4 4 88)

LRB-P-H-761 - The LRB hazardous gas detection system can cause or be jeopardized by electrical system malfunction during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (4 4 88)

LRB-P-H-762 - The LRB hazardous gas detection system can cause or be jeopardized by electrical system malfunction during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (4 4 88)

LRB-P-H-763 - The LRB hazardous gas detection system can cause or be jeopardized by electrical system malfunction during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 4 88)

LRB-P-H-764 - The LRB hazardous gas detection system can cause or be jeopardized by electrical system malfunction during descent from separation to ocean impact. -- This hazard is not credible. (4 4 88)

LRB-P-H-765 - The LRB hazardous gas detection system can cause or be jeopardized by electrical system malfunction during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 4 88)

LRB-P-H-766 - The LRB hazardous gas detection system can cause or be jeopardized by electrical system malfunction during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 4 88)

LRB-P-H-767 - The LRB hazardous gas detection system can cause or be

jeopardized by electrical system malfunction during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (4 4 88)

LRB-P-H-768 - The LRB hazardous gas detection system can cause or be jeopardized by electrical system malfunction during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-769 - The LRB hazardous gas detection system can cause or be jeopardized by differential pressure during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (4 4 88)

LRB-P-H-770 - The LRB hazardous gas detection system can cause or be jeopardized by differential pressure during manufacture and fabrication of subsystems and components. -- Obvious hazards exist due to overpressurization of components during proof testing. However, this is considered to be of low probability, and the effects would be immediately apparent. Damage to any part of the HGDS during manufacture would be resolved by substituting a good component; therefore the potential for damage to the completed vehicle from this cause is negligible. (4 4 88)

LRB-P-H-771 - The LRB hazardous gas detection system can cause or be jeopardized by differential pressure during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-772 - The LRB hazardous gas detection system can cause or be jeopardized by differential pressure during proof test of pressure vessels and structure. -- See hazard # 770. (4 4 88)

LRB-P-H-773 - The LRB hazardous gas detection system can cause or be jeopardized by differential pressure during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-774 - The LRB hazardous gas detection system can cause or be jeopardized by differential pressure during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-775 - The LRB hazardous gas detection system can cause or be jeopardized by differential pressure during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-776 - The LRB hazardous gas detection system can cause or be jeopardized by differential pressure during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-777 - The LRB hazardous gas detection system can cause or be jeopardized by differential pressure during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-778 - The LRB hazardous gas detection system can cause or be jeopardized by differential pressure during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-779 - The LRB hazardous gas detection system can cause or be jeopardized by differential pressure during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-780 - The LRB hazardous gas detection system can cause or be jeopardized by differential pressure during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-781 - The LRB hazardous gas detection system can cause or be jeopardized by differential pressure during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-782 - The LRB hazardous gas detection system can cause or be jeopardized by differential pressure during propellant loading for test or flight. -- At the current state of maturity hazard cannot be evaluated. (4 4 88)

LRB-P-H-783 - The LRB hazardous gas detection system can cause or be jeopardized by differential pressure during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-784 - The LRB hazardous gas detection system can cause or be jeopardized by differential pressure during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-785 - The LRB hazardous gas detection system can cause or be jeopardized by differential pressure during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-786 - The LRB hazardous gas detection system can cause or be jeopardized by differential pressure during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-787 - The LRB hazardous gas detection system can cause or be jeopardized by differential pressure during separation of the LRB from the STS

vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-788 - The LRB hazardous gas detection system can cause or be jeopardized by differential pressure during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-789 - The LRB hazardous gas detection system can cause or be jeopardized by differential pressure during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-790 - The LRB hazardous gas detection system can cause or be jeopardized by differential pressure during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-791 - The LRB hazardous gas detection system can cause or be jeopardized by differential pressure during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-792 - The LRB hazardous gas detection system can cause or be jeopardized by differential pressure during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-793 - The LRB hazardous gas detection system can cause or be jeopardized by vibration, acoustic loads or shock during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (4 4 88)

LRB-P-H-794 - The LRB hazardous gas detection system can cause or be jeopardized by vibration, acoustic loads or shock during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-795 - The LRB hazardous gas detection system can cause or be jeopardized by vibration, acoustic loads or shock during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-796 - The LRB hazardous gas detection system can cause or be jeopardized by vibration, acoustic loads or shock during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-797 - The LRB hazardous gas detection system can cause or be jeopardized by vibration, acoustic loads or shock during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this

hazard cannot be evaluated. (4 4 88)

LRB-P-H-798 - The LRB hazardous gas detection system can cause or be jeopardized by vibration, acoustic loads or shock during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-800 - The LRB hazardous gas detection system can cause or be jeopardized by vibration, acoustic loads or shock during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-801 - The LRB hazardous gas detection system can cause or be jeopardized by vibration, acoustic loads or shock during transportation from manufacture to launch site or after recovery. -- This hazard is analyzed as H-799. (4 4 88)

LRB-P-H-802 - The LRB hazardous gas detection system can cause or be jeopardized by vibration, acoustic loads or shock during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-803 - The LRB hazardous gas detection system can cause or be jeopardized by vibration, acoustic loads or shock during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-804 - The LRB hazardous gas detection system can cause or be jeopardized by vibration, acoustic loads or shock during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-805 - The LRB hazardous gas detection system can cause or be jeopardized by vibration, acoustic loads or shock during rollout from the VAB and preloading preparation. -- This hazard is analyzed as H-799. (4 4 88)

LRB-P-H-806 - The LRB hazardous gas detection system can cause or be jeopardized by vibration, acoustic loads or shock during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-807 - The LRB hazardous gas detection system can cause or be jeopardized by vibration, acoustic loads or shock during countdown to liftoff or abort. -- This hazard is analyzed as H-799. (4 4 88)

LRB-P-H-808 - The LRB hazardous gas detection system can cause or be jeopardized by vibration, acoustic loads or shock during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as H-799. (4 4 88)

LRB-P-H-809 - The LRB hazardous gas detection system can cause or be jeopardized by vibration, acoustic loads or shock during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (4 4 88)

LRB-P-H-810 - The LRB hazardous gas detection system can cause or be jeopardized by vibration, acoustic loads or shock during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (4 4 88)

LRB-P-H-811 - The LRB hazardous gas detection system can cause or be jeopardized by vibration, acoustic loads or shock during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 4 88)

LRB-P-H-812 - The LRB hazardous gas detection system can cause or be jeopardized by vibration, acoustic loads or shock during descent from separation to ocean impact. -- This hazard is not credible. (4 4 88)

LRB-P-H-813 - The LRB hazardous gas detection system can cause or be jeopardized by vibration, acoustic loads or shock during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 4 88)

LRB-P-H-814 - The LRB hazardous gas detection system can cause or be jeopardized by vibration, acoustic loads or shock during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 4 88)

LRB-P-H-815 - The LRB hazardous gas detection system can cause or be jeopardized by vibration, acoustic loads or shock during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-816 - The LRB hazardous gas detection system can cause or be jeopardized by vibration, acoustic loads or shock during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-841 - The LRB hazardous gas detection system can cause or be jeopardized by leaks during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (4 4 88)

LRB-P-H-842 - The LRB hazardous gas detection system can cause or be jeopardized by leaks during manufacture and fabrication of subsystems and components. -- This hazard is analyzed as H-531. (4 4 88)

LRB-P-H-843 - The LRB hazardous gas detection system can cause or be jeopardized by leaks during inspection and test of the LRB and subsystems. -- This hazard is analyzed as H-531. (4 4 88)

LRB-P-H-844 - The LRB hazardous gas detection system can cause or be jeopardized by leaks during proof test of pressure vessels and structure. -- This hazard is analyzed as H-531. (4 4 88)

LRB-P-H-845 - The LRB hazardous gas detection system can cause or be jeopardized by leaks during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-846 - The LRB hazardous gas detection system can cause or be jeopardized by leaks during test firing of engines and/or the completed booster. -- This hazard is analyzed as H-799. (4 4 88)

LRB-P-H-847 - The LRB hazardous gas detection system can cause or be jeopardized by leaks during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as H-799. (4 4 88)

LRB-P-H-848 - The LRB hazardous gas detection system can cause or be jeopardized by leaks during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-849 - The LRB hazardous gas detection system can cause or be jeopardized by leaks during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-850 - The LRB hazardous gas detection system can cause or be jeopardized by leaks during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-851 - The LRB hazardous gas detection system can cause or be jeopardized by leaks during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-852 - The LRB hazardous gas detection system can cause or be jeopardized by leaks during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-853 - The LRB hazardous gas detection system can cause or be jeopardized by leaks during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-854 - The LRB hazardous gas detection system can cause or be jeopardized by leaks during propellant loading for test or flight. -- This hazard is analyzed as H-799. (4 4 88)

LRB-P-H-855 - The LRB hazardous gas detection system can cause or be jeopardized by leaks during countdown to liftoff or abort. -- This hazard is analyzed as H-531 and/or H-799. (4 4 88)

LRB-P-H-856 - The LRB hazardous gas detection system can cause or be jeopardized by leaks during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as H-799 and/or H-531. (4 4 88)

LRB-P-H-857 - The LRB hazardous gas detection system can cause or be jeopardized by leaks during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-858 - The LRB hazardous gas detection system can cause or be jeopardized by leaks during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-859 - The LRB hazardous gas detection system can cause or be jeopardized by leaks during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-860 - The LRB hazardous gas detection system can cause or be jeopardized by leaks during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-861 - The LRB hazardous gas detection system can cause or be jeopardized by leaks during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-862 - The LRB hazardous gas detection system can cause or be jeopardized by leaks during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-863 - The LRB hazardous gas detection system can cause or be jeopardized by leaks during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-864 - The LRB hazardous gas detection system can cause or be jeopardized by leaks during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-865 - The LRB hazardous gas detection system can cause or be jeopardized by propellant characteristics and products during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (4 4 88)

LRB-P-H-866 - The LRB hazardous gas detection system can cause or be jeopardized by propellant characteristics and products during manufacture and fabrication of subsystems and components. -- This hazard is not credible. (4 4 88)

LRB-P-H-867 - The LRB hazardous gas detection system can cause or be jeopardized by propellant characteristics and products during inspection and test of the LRB and subsystems. -- See hazard D H-531. (4 4 88)

LRB-P-H-868 - The LRB hazardous gas detection system can cause or be jeopardized by propellant characteristics and products during proof test of pressure vessels and structure. -- Proof test is not likely to involve the use of hazardous propellants. (4 4 88)

LRB-P-H-869 - The LRB hazardous gas detection system can cause or be jeopardized by propellant characteristics and products during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (4 4 88)

LRB-P-H-870 - The LRB hazardous gas detection system can cause or be jeopardized by propellant characteristics and products during test firing of engines and/or the completed booster. -- Proof test instrumentation is likely to be designed specifically for the configuration in which the booster or its subsystems are tested. Therefore, it is assumed that this hazard will be resolved during the normal course of design maturity. (4 4 88)

LRB-P-H-872 - The LRB hazardous gas detection system can cause or be jeopardized by propellant characteristics and products during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-873 - The LRB hazardous gas detection system can cause or be jeopardized by propellant characteristics and products during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (4 4 88)

LRB-P-H-874 - The LRB hazardous gas detection system can cause or be jeopardized by propellant characteristics and products during storage, including storage of major components. -- This hazard is not credible. (4 4 88)

LRB-P-H-875 - The LRB hazardous gas detection system can cause or be jeopardized by propellant characteristics and products during preflight checkout prior to stacking. -- This hazard is not credible. (4 4 88)

LRB-P-H-876 - The LRB hazardous gas detection system can cause or be jeopardized by propellant characteristics and products during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (4 4 88)

LRB-P-H-877 - The LRB hazardous gas detection system can cause or be

jeopardized by propellant characteristics and products during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 4 88)

LRB-P-H-878 - The LRB hazardous gas detection system can cause or be jeopardized by propellant characteristics and products during propellant loading for test or flight. -- This hazard is analyzed as H-871. (4 4 88)

LRB-P-H-879 - The LRB hazardous gas detection system can cause or be jeopardized by propellant characteristics and products during countdown to liftoff or abort. -- This hazard is analyzed as H-871. (4 4 88)

LRB-P-H-880 - The LRB hazardous gas detection system can cause or be jeopardized by propellant characteristics and products during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as H-871. (4 4 88)

LRB-P-H-881 - The LRB hazardous gas detection system can cause or be jeopardized by propellant characteristics and products during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-882 - The LRB hazardous gas detection system can cause or be jeopardized by propellant characteristics and products during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-883 - The LRB hazardous gas detection system can cause or be jeopardized by propellant characteristics and products during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-884 - The LRB hazardous gas detection system can cause or be jeopardized by propellant characteristics and products during descent from separation to ocean impact. -- This hazard is not credible. (4 4 88)

LRB-P-H-885 - The LRB hazardous gas detection system can cause or be jeopardized by propellant characteristics and products during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 4 88)

LRB-P-H-886 - The LRB hazardous gas detection system can cause or be jeopardized by propellant characteristics and products during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 4 88)

LRB-P-H-887 - The LRB hazardous gas detection system can cause or be jeopardized by propellant characteristics and products during recovery activities,

including towing, and retrieval of recoverables. -- This hazard is not credible. (4 4 88)

LRB-P-H-888 - The LRB hazardous gas detection system can cause or be jeopardized by propellant characteristics and products during refurbishment of reusable components. -- This hazard is not credible. (4 4 88)

LRB-P-H-889 - The LRB hazardous gas detection system can cause or be jeopardized by lightning or electromagnetic discharge during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (4 4 88)

LRB-P-H-890 - The LRB hazardous gas detection system can cause or be jeopardized by lightning or electromagnetic discharge during manufacture and fabrication of subsystems and components. -- This hazard is not credible. (4 4 88)

LRB-P-H-891 - The LRB hazardous gas detection system can cause or be jeopardized by lightning or electromagnetic discharge during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-892 - The LRB hazardous gas detection system can cause or be jeopardized by lightning or electromagnetic discharge during proof test of pressure vessels and structure. -- This hazard is analyzed as G-748. (4 4 88)

LRB-P-H-893 - The LRB hazardous gas detection system can cause or be jeopardized by lightning or electromagnetic discharge during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-894 - The LRB hazardous gas detection system can cause or be jeopardized by lightning or electromagnetic discharge during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-895 - The LRB hazardous gas detection system can cause or be jeopardized by lightning or electromagnetic discharge during flight readiness firing (FRF) of the STS vehicle. -- It is assumed that FRF will not be conducted when lightning is a hazard. (4 4 88)

LRB-P-H-896 - The LRB hazardous gas detection system can cause or be jeopardized by lightning or electromagnetic discharge during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-897 - The LRB hazardous gas detection system can cause or be jeopardized by lightning or electromagnetic discharge during transportation from

manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-898 - The LRB hazardous gas detection system can cause or be jeopardized by lightning or electromagnetic discharge during storage, including storage of major components. -- This hazard is not credible. (4 4 88)

LRB-P-H-899 - The LRB hazardous gas detection system can cause or be jeopardized by lightning or electromagnetic discharge during preflight checkout prior to stacking. -- This hazard is not credible. (4 4 88)

LRB-P-H-900 - The LRB hazardous gas detection system can cause or be jeopardized by lightning or electromagnetic discharge during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (4 4 88)

LRB-P-H-901 - The LRB hazardous gas detection system can cause or be jeopardized by lightning or electromagnetic discharge during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-903 - The LRB hazardous gas detection system can cause or be jeopardized by lightning or electromagnetic discharge during countdown to liftoff or abort. -- This hazard is analyzed as H-902. (4 4 88)

LRB-P-H-904 - The LRB hazardous gas detection system can cause or be jeopardized by lightning or electromagnetic discharge during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as H-902. (4 4 88)

LRB-P-H-905 - The LRB hazardous gas detection system can cause or be jeopardized by lightning or electromagnetic discharge during nominal flight from liftoff to LRB burnout. -- It is assumed that the umbilical connection to the HGDS will be grounded to the vehicle structure so that static discharge cannot take plact at the umbilical and that the manifold cannot form a current path into the interior of previously purged compartments where leaks may accumulate during flight. (4 4 88)

LRB-P-H-906 - The LRB hazardous gas detection system can cause or be jeopardized by lightning or electromagnetic discharge during intact abort, including RTLS, TAL, AOA and ATO. -- See comments for H-905. (4 4 88)

LRB-P-H-907 - The LRB hazardous gas detection system can cause or be jeopardized by lightning or electromagnetic discharge during separation of the LRB from the STS vehicle. -- See comments for H-905. (4 4 88)

LRB-P-H-908 - The LRB hazardous gas detection system can cause or be

jeopardized by lightning or electromagnetic discharge during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-909 - The LRB hazardous gas detection system can cause or be jeopardized by lightning or electromagnetic discharge during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-910 - The LRB hazardous gas detection system can cause or be jeopardized by lightning or electromagnetic discharge during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-911 - The LRB hazardous gas detection system can cause or be jeopardized by lightning or electromagnetic discharge during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-912 - The LRB hazardous gas detection system can cause or be jeopardized by lightning or electromagnetic discharge during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-913 - The LRB hazardous gas detection system can cause or be jeopardized by faulty documentation during component or material purchase, including acquisition of GFP. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-914 - The LRB hazardous gas detection system can cause or be jeopardized by faulty documentation during manufacture and fabrication of subsystems and components. -- Hazards due to faulty documentation during manufacture are associated with manufacturing process plans and inspection documentation. The adequacy of such plans cannot be assessed at this time. (4 4 88)

LRB-P-H-915 - The LRB hazardous gas detection system can cause or be jeopardized by faulty documentation during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-916 - The LRB hazardous gas detection system can cause or be jeopardized by faulty documentation during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-917 - The LRB hazardous gas detection system can cause or be

jeopardized by faulty documentation during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-918 - The LRB hazardous gas detection system can cause or be jeopardized by faulty documentation during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-919 - The LRB hazardous gas detection system can cause or be jeopardized by faulty documentation during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-920 - The LRB hazardous gas detection system can cause or be jeopardized by faulty documentation during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-921 - The LRB hazardous gas detection system can cause or be jeopardized by faulty documentation during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-922 - The LRB hazardous gas detection system can cause or be jeopardized by faulty documentation during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-923 - The LRB hazardous gas detection system can cause or be jeopardized by faulty documentation during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-924 - The LRB hazardous gas detection system can cause or be jeopardized by faulty documentation during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-925 - The LRB hazardous gas detection system can cause or be jeopardized by faulty documentation during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-926 - The LRB hazardous gas detection system can cause or be jeopardized by faulty documentation during propellant loading for test or flight. -- Instructions for and documentation of operations, maintenance, repair, service, testing, and verification of all flight systems will require a complete review prior to

system testing or launch of the STS with LRBs. At this time hazards associated with this documentation which might be the subject of such a review cannot be properly identified or evaluated. (4 4 88)

LRB-P-H-927 - The LRB hazardous gas detection system can cause or be jeopardized by faulty documentation during countdown to liftoff or abort. -- See the comment for H-926. (4 4 88)

LRB-P-H-928 - The LRB hazardous gas detection system can cause or be jeopardized by faulty documentation during launch abort activities, including mission postponement (scrub). -- See the comment for H-926. (4 4 88)

LRB-P-H-929 - The LRB hazardous gas detection system can cause or be jeopardized by faulty documentation during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-930 - The LRB hazardous gas detection system can cause or be jeopardized by faulty documentation during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (4 4 88)

LRB-P-H-931 - The LRB hazardous gas detection system can cause or be jeopardized by faulty documentation during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 4 88)

LRB-P-H-932 - The LRB hazardous gas detection system can cause or be jeopardized by faulty documentation during descent from separation to ocean impact. -- This hazard is not credible. (4 4 88)

LRB-P-H-933 - The LRB hazardous gas detection system can cause or be jeopardized by faulty documentation during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 4 88)

LRB-P-H-934 - The LRB hazardous gas detection system can cause or be jeopardized by faulty documentation during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 4 88)

LRB-P-H-935 - The LRB hazardous gas detection system can cause or be jeopardized by faulty documentation during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-936 - The LRB hazardous gas detection system can cause or be jeopardized by faulty documentation during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-937 - The LRB hazardous gas detection system can cause or be

jeopardized by chemical activity during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (4 4 88)

LRB-P-H-938 - The LRB hazardous gas detection system can cause or be jeopardized by chemical activity during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-939 - The LRB hazardous gas detection system can cause or be jeopardized by chemical activity during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-940 - The LRB hazardous gas detection system can cause or be jeopardized by chemical activity during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-941 - The LRB hazardous gas detection system can cause or be jeopardized by chemical activity during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-942 - The LRB hazardous gas detection system can cause or be jeopardized by chemical activity during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-943 - The LRB hazardous gas detection system can cause or be jeopardized by chemical activity during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-944 - The LRB hazardous gas detection system can cause or be jeopardized by chemical activity during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-945 - The LRB hazardous gas detection system can cause or be jeopardized by chemical activity during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-946 - The LRB hazardous gas detection system can cause or be jeopardized by chemical activity during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-947 - The LRB hazardous gas detection system can cause or be

jeopardized by chemical activity during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-948 - The LRB hazardous gas detection system can cause or be jeopardized by chemical activity during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-949 - The LRB hazardous gas detection system can cause or be jeopardized by chemical activity during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-950 - The LRB hazardous gas detection system can cause or be jeopardized by chemical activity during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-951 - The LRB hazardous gas detection system can cause or be jeopardized by chemical activity during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-952 - The LRB hazardous gas detection system can cause or be jeopardized by chemical activity during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-953 - The LRB hazardous gas detection system can cause or be jeopardized by chemical activity during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-954 - The LRB hazardous gas detection system can cause or be jeopardized by chemical activity during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-955 - The LRB hazardous gas detection system can cause or be jeopardized by chemical activity during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-956 - The LRB hazardous gas detection system can cause or be jeopardized by chemical activity during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-957 - The LRB hazardous gas detection system can cause or be jeopardized by chemical activity during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-958 - The LRB hazardous gas detection system can cause or be jeopardized by chemical activity during floatation (of recoverable boosters) until recovery. -- Obvious hazards due to chemical activity involve the corrosive effects of seawater immersion. It is assumed that this will be a design condition and that the final design of the HGDS will either protect the system against the effects of seawater, or will allow the system to be discarded (and possibly replaced) after use. (4 4 88)

LRB-P-H-959 - The LRB hazardous gas detection system can cause or be jeopardized by chemical activity during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-960 - The LRB hazardous gas detection system can cause or be jeopardized by chemical activity during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-985 - The LRB hazardous gas detection system can cause or be jeopardized by operator error during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (4 4 88)

LRB-P-H-986 - The LRB hazardous gas detection system can cause or be jeopardized by operator error during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-987 - The LRB hazardous gas detection system can cause or be jeopardized by operator error during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-988 - The LRB hazardous gas detection system can cause or be jeopardized by operator error during proof test of pressure vessels and structure. -- Although system damage during proof test due to operator error is credible, it is assumed that such damage would be readily apparent and that the damaged system would be mediately replaced. Therefore, although this hazard is credible for the individual components, it is not considered credible as a subsystem of a fully certified and delivered vehicle. (4 4 88)

LRB-P-H-989 - The LRB hazardous gas detection system can cause or be jeopardized by operator error during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-990 - The LRB hazardous gas detection system can cause or be jeopardized by operator error during test firing of engines and/or the completed booster. -- This hazard is analyzed as H-559. (4 4 88)

LRB-P-H-991 - The LRB hazardous gas detection system can cause or be jeopardized by operator error during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as H-559. (4 4 88)

LRB-P-H-992 - The LRB hazardous gas detection system can cause or be jeopardized by operator error during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-993 - The LRB hazardous gas detection system can cause or be jeopardized by operator error during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-994 - The LRB hazardous gas detection system can cause or be jeopardized by operator error during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-995 - The LRB hazardous gas detection system can cause or be jeopardized by operator error during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-996 - The LRB hazardous gas detection system can cause or be jeopardized by operator error during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-997 - The LRB hazardous gas detection system can cause or be jeopardized by operator error during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-998 - The LRB hazardous gas detection system can cause or be jeopardized by operator error during propellant loading for test or flight. -- This hazard is analyzed as H-559. (4 4 88)

LRB-P-H-999 - The LRB hazardous gas detection system can cause or be jeopardized by operator error during countdown to liftoff or abort. -- This hazard is analyzed as H-559. See also H-871. (4 4 88)

LRB-P-H-1000 - The LRB hazardous gas detection system can cause or be jeopardized by operator error during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as H-559. (4 4 88)

LRB-P-H-1001 - The LRB hazardous gas detection system can cause or be jeopardized by operator error during nominal flight from liftoff to LRB burnout. -- At the

current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-1002 - The LRB hazardous gas detection system can cause or be jeopardized by operator error during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-1003 - The LRB hazardous gas detection system can cause or be jeopardized by operator error during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 4 88)

LRB-P-H-1004 - The LRB hazardous gas detection system can cause or be jeopardized by operator error during descent from separation to ocean impact. -- This hazard is not credible. (4 4 88)

LRB-P-H-1005 - The LRB hazardous gas detection system can cause or be jeopardized by operator error during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 4 88)

LRB-P-H-1006 - The LRB hazardous gas detection system can cause or be jeopardized by operator error during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 4 88)

LRB-P-H-1007 - The LRB hazardous gas detection system can cause or be jeopardized by operator error during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-1008 - The LRB hazardous gas detection system can cause or be jeopardized by operator error during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-1033 - The LRB hazardous gas detection system can cause or be jeopardized by emergencies during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (4 4 88)

LRB-P-H-1034 - The LRB hazardous gas detection system can cause or be jeopardized by emergencies during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-1035 - The LRB hazardous gas detection system can cause or be jeopardized by emergencies during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-1036 - The LRB hazardous gas detection system can cause or be jeopardized by emergencies during proof test of pressure vessels and structure. -- At

the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-1037 - The LRB hazardous gas detection system can cause or be jeopardized by emergencies during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-1038 - The LRB hazardous gas detection system can cause or be jeopardized by emergencies during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-1039 - The LRB hazardous gas detection system can cause or be jeopardized by emergencies during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-1040 - The LRB hazardous gas detection system can cause or be jeopardized by emergencies during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-1041 - The LRB hazardous gas detection system can cause or be jeopardized by emergencies during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-1042 - The LRB hazardous gas detection system can cause or be jeopardized by emergencies during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-1043 - The LRB hazardous gas detection system can cause or be jeopardized by emergencies during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-1044 - The LRB hazardous gas detection system can cause or be jeopardized by emergencies during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-1045 - The LRB hazardous gas detection system can cause or be jeopardized by emergencies during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-1046 - The LRB hazardous gas detection system can cause or be jeopardized by emergencies during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-1047 - The LRB hazardous gas detection system can cause or be

jeopardized by emergencies during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-1048 - The LRB hazardous gas detection system can cause or be jeopardized by emergencies during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-1049 - The LRB hazardous gas detection system can cause or be jeopardized by emergencies during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-1050 - The LRB hazardous gas detection system can cause or be jeopardized by emergencies during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-1051 - The LRB hazardous gas detection system can cause or be jeopardized by emergencies during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 4 88)

LRB-P-H-1052 - The LRB hazardous gas detection system can cause or be jeopardized by emergencies during descent from separation to ocean impact. -- This hazard is not credible. (4 4 88)

LRB-P-H-1053 - The LRB hazardous gas detection system can cause or be jeopardized by emergencies during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 4 88)

LRB-P-H-1054 - The LRB hazardous gas detection system can cause or be jeopardized by emergencies during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 4 88)

LRB-P-H-1055 - The LRB hazardous gas detection system can cause or be jeopardized by emergencies during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

LRB-P-H-1056 - The LRB hazardous gas detection system can cause or be jeopardized by emergencies during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 4 88)

THESE HAZARDS WERE CONSIDERED BY THE ANALYST BUT WERE NOT FURTHER ANALYZED FOR THE REASONS GIVEN

LRB-P-I-529 - LRB/ET interfaces can cause or be jeopardized by hazardous environments during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (4 5 88)

LRB-P-I-531 - LRB/ET interfaces can cause or be jeopardized by hazardous environments during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 5 88)

LRB-P-I-532 - LRB/ET interfaces can cause or be jeopardized by hazardous environments during proof test of pressure vessels and structure. -- The LRB/ET interfaces transfer loads from the LRB to the ET, and therefore will be proof tested for each vehicle. Avoidance of damage during proof testing is analyzed as G-748. (4 5 88)

LRB-P-I-533 - LRB/ET interfaces can cause or be jeopardized by hazardous environments during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 5 88)

LRB-P-I-534 - LRB/ET interfaces can cause or be jeopardized by hazardous environments during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 5 88)

LRB-P-I-536 - LRB/ET interfaces can cause or be jeopardized by hazardous environments during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 5 88)

LRB-P-I-537 - LRB/ET interfaces can cause or be jeopardized by hazardous environments during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 5 88)

LRB-P-I-538 - LRB/ET interfaces can cause or be jeopardized by hazardous environments during storage, including storage of major components. -- It is assumed that storage environments will not be hazardous. (4 5 88)

LRB-P-I-539 - LRB/ET interfaces can cause or be jeopardized by hazardous environments during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 5 88)

LRB-P-I-540 - LRB/ET interfaces can cause or be jeopardized by hazardous environments during vehicle stacking, including ancillary test activities. -- A portion of this hazard is analyzed as F-588. Otherwise, the hazard cannot be evaluated at this

time. (4 5 88)

LRB-P-I-541 - LRB/ET interfaces can cause or be jeopardized by hazardous environments during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 5 88)

LRB-P-I-544 - LRB/ET interfaces can cause or be jeopardized by hazardous environments during launch abort activities, including mission postponement (scrub). -- This is essentially the same hazard as I-543. (4 6 88)

LRB-P-I-546 - LRB/ET interfaces can cause or be jeopardized by hazardous environments during intact abort, including RTLS, TAL, AOA and ATO. -- This is the same hazard as I-545. (4 6 88)

LRB-P-I-547 - LRB/ET interfaces can cause or be jeopardized by hazardous environments during separation of the LRB from the STS vehicle. -- This hazard is evaluated as B-547 and B-691. (4 6 88)

LRB-P-I-548 - LRB/ET interfaces can cause or be jeopardized by hazardous environments during descent from separation to ocean impact. -- This hazard is not credible. (4 6 88)

LRB-P-I-549 - LRB/ET interfaces can cause or be jeopardized by hazardous environments during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 6 88)

LRB-P-I-550 - LRB/ET interfaces can cause or be jeopardized by hazardous environments during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 6 88)

LRB-P-I-551 - LRB/ET interfaces can cause or be jeopardized by hazardous environments during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (4 6 88)

LRB-P-I-552 - LRB/ET interfaces can cause or be jeopardized by hazardous environments during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 6 88)

LRB-P-I-553 - LRB/ET interfaces can cause or be jeopardized by worker overload during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (4 6 88)

LRB-P-I-554 - LRB/ET interfaces can cause or be jeopardized by worker overload during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 6 88)

LRB-P-I-555 - LRB/ET interfaces can cause or be jeopardized by worker overload during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 6 88)

LRB-P-I-556 - LRB/ET interfaces can cause or be jeopardized by worker overload during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (4 6 88)

LRB-P-I-557 - LRB/ET interfaces can cause or be jeopardized by worker overload during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 6 88)

LRB-P-I-558 - LRB/ET interfaces can cause or be jeopardized by worker overload during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 6 88)

LRB-P-I-559 - LRB/ET interfaces can cause or be jeopardized by worker overload during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 6 88)

LRB-P-I-560 - LRB/ET interfaces can cause or be jeopardized by worker overload during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 6 88)

LRB-P-I-561 - LRB/ET interfaces can cause or be jeopardized by worker overload during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 6 88)

LRB-P-I-562 - LRB/ET interfaces can cause or be jeopardized by worker overload during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (4 6 88)

LRB-P-I-563 - LRB/ET interfaces can cause or be jeopardized by worker overload during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 6 88)

LRB-P-I-564 - LRB/ET interfaces can cause or be jeopardized by worker overload during vehicle stacking, including ancillary test activities. -- This hazard is similar to F-588 and is evaluated as that hazard. (4 6 88)

LRB-P-I-565 - LRB/ET interfaces can cause or be jeopardized by worker overload during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 6 88)

LRB-P-I-566 - LRB/ET interfaces can cause or be jeopardized by worker overload during propellant loading for test or flight. -- At the current state of maturity, this

hazard cannot be evaluated. (4 6 88)

LRB-P-I-567 - LRB/ET interfaces can cause or be jeopardized by worker overload during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 6 88)

LRB-P-I-568 - LRB/ET interfaces can cause or be jeopardized by worker overload during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 6 88)

LRB-P-I-569 - LRB/ET interfaces can cause or be jeopardized by worker overload during nominal flight from liftoff to LRB burnout. -- This hazard is similar to I-570, which is evaluated as C-570. (4 6 88)

LRB-P-I-570 - LRB/ET interfaces can cause or be jeopardized by worker overload during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is evaluated as C-570. (4 6 88)

LRB-P-I-571 - LRB/ET interfaces can cause or be jeopardized by worker overload during separation of the LRB from the STS vehicle. -- This hazard is evaluated as C-570. (4 6 88)

LRB-P-I-572 - LRB/ET interfaces can cause or be jeopardized by worker overload during descent from separation to ocean impact. -- This hazard is not credible. (4 6 88)

LRB-P-I-573 - LRB/ET interfaces can cause or be jeopardized by worker overload during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 6 88)

LRB-P-I-574 - LRB/ET interfaces can cause or be jeopardized by worker overload during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 6 88)

LRB-P-I-575 - LRB/ET interfaces can cause or be jeopardized by worker overload during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 6 88)

LRB-P-I-576 - LRB/ET interfaces can cause or be jeopardized by worker overload during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 6 88)

LRB-P-I-577 - LRB/ET interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (4 6 88)

LRB-P-I-578 - LRB/ET interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 6 88)

LRB-P-I-580 - LRB/ET interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (4 6 88)

LRB-P-I-581 - LRB/ET interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 6 88)

LRB-P-I-582 - LRB/ET interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 6 88)

LRB-P-I-583 - LRB/ET interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 6 88)

LRB-P-I-584 - LRB/ET interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 6 88)

LRB-P-I-585 - LRB/ET interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 6 88)

LRB-P-I-586 - LRB/ET interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (4 6 88)

LRB-P-I-587 - LRB/ET interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during preflight checkout prior to stacking. -- This hazard is associated with test and inspection and is evaluated as I-579. (4 6 88)

LRB-P-I-588 - LRB/ET interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during vehicle stacking, including ancillary test activities. -- This hazard is evaluated as I-579 and F-588. (4 6 88)

LRB-P-I-589 - LRB/ET interfaces can cause or be jeopardized by unsafe or

unhygienic working conditions during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 6 88)

LRB-P-I-590 - LRB/ET interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 6 88)

LRB-P-I-591 - LRB/ET interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 6 88)

LRB-P-I-592 - LRB/ET interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 6 88)

LRB-P-I-593 - LRB/ET interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (4 6 88)

LRB-P-I-594 - LRB/ET interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (4 6 88)

LRB-P-I-595 - LRB/ET interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 6 88)

LRB-P-I-596 - LRB/ET interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during descent from separation to ocean impact. -- This hazard is not credible. (4 6 88)

LRB-P-I-597 - LRB/ET interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 6 88)

LRB-P-I-598 - LRB/ET interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 6 88)

LRB-P-I-599 - LRB/ET interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 6 88)

LRB-P-I-600 - LRB/ET interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 6 88)

LRB-P-I-649 - LRB/ET interfaces can cause or be jeopardized by contamination during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (4 6 88)

LRB-P-I-650 - LRB/ET interfaces can cause or be jeopardized by contamination during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 6 88)

LRB-P-I-651 - LRB/ET interfaces can cause or be jeopardized by contamination during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 6 88)

LRB-P-I-652 - LRB/ET interfaces can cause or be jeopardized by contamination during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (4 6 88)

LRB-P-I-653 - LRB/ET interfaces can cause or be jeopardized by contamination during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 6 88)

LRB-P-I-654 - LRB/ET interfaces can cause or be jeopardized by contamination during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 6 88)

LRB-P-I-655 - LRB/ET interfaces can cause or be jeopardized by contamination during flight readiness firing (FRF) of the STS vehicle. -- This hazard references the condition analyzed as E-1027. (4 6 88)

LRB-P-I-656 - LRB/ET interfaces can cause or be jeopardized by contamination during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-657 - LRB/ET interfaces can cause or be jeopardized by contamination during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-658 - LRB/ET interfaces can cause or be jeopardized by contamination during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-659 - LRB/ET interfaces can cause or be jeopardized by contamination during preflight checkout prior to stacking. -- At the current state of maturity, this

hazard cannot be evaluated. (4 7 88)

LRB-P-I-660 - LRB/ET interfaces can cause or be jeopardized by contamination during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-661 - LRB/ET interfaces can cause or be jeopardized by contamination during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-662 - LRB/ET interfaces can cause or be jeopardized by contamination during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-663 - LRB/ET interfaces can cause or be jeopardized by contamination during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-664 - LRB/ET interfaces can cause or be jeopardized by contamination during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-665 - LRB/ET interfaces can cause or be jeopardized by contamination during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-666 - LRB/ET interfaces can cause or be jeopardized by contamination during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-667 - LRB/ET interfaces can cause or be jeopardized by contamination during separation of the LRB from the STS vehicle. -- This hazard is analyzed as E-1027. (4 7 88)

LRB-P-I-668 - LRB/ET interfaces can cause or be jeopardized by contamination during descent from separation to ocean impact. -- This hazard is not credible. (4 7 88)

LRB-P-I-669 - LRB/ET interfaces can cause or be jeopardized by contamination during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 7 88)

LRB-P-I-670 - LRB/ET interfaces can cause or be jeopardized by contamination during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-671 - LRB/ET interfaces can cause or be jeopardized by contamination during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-672 - LRB/ET interfaces can cause or be jeopardized by contamination during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-673 - LRB/ET interfaces can cause or be jeopardized by heat sources during component or material purchase, including acquisition of GFP. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-674 - LRB/ET interfaces can cause or be jeopardized by heat sources during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-675 - LRB/ET interfaces can cause or be jeopardized by heat sources during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-676 - LRB/ET interfaces can cause or be jeopardized by heat sources during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-677 - LRB/ET interfaces can cause or be jeopardized by heat sources during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-678 - LRB/ET interfaces can cause or be jeopardized by heat sources during test firing of engines and/or the completed booster. -- This hazard is analyzed as I-535, I-542 and I-543. (4 7 88)

LRB-P-I-679 - LRB/ET interfaces can cause or be jeopardized by heat sources during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as I-535, I-542 and I-543. (4 7 88)

LRB-P-I-680 - LRB/ET interfaces can cause or be jeopardized by heat sources during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-681 - LRB/ET interfaces can cause or be jeopardized by heat sources during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-682 - LRB/ET interfaces can cause or be jeopardized by heat sources during storage, including storage of major components. -- It is assumed that LRBs in

storage will be protected from hazardous heat sources. (4 7 88)

LRB-P-I-683 - LRB/ET interfaces can cause or be jeopardized by heat sources during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-684 - LRB/ET interfaces can cause or be jeopardized by heat sources during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-685 - LRB/ET interfaces can cause or be jeopardized by heat sources during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-686 - LRB/ET interfaces can cause or be jeopardized by heat sources during propellant loading for test or flight. -- This hazard is analyzed as I-535 and I-542. (4 7 88)

LRB-P-I-687 - LRB/ET interfaces can cause or be jeopardized by heat sources during countdown to liftoff or abort. -- This hazard is analyzed as I-535 and I-542. (4 7 88)

LRB-P-I-688 - LRB/ET interfaces can cause or be jeopardized by heat sources during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as I-535, I-542 and I-543. (4 7 88)

LRB-P-I-689 - LRB/ET interfaces can cause or be jeopardized by heat sources during nominal flight from liftoff to LRB burnout. -- This hazard is analyzed as I-545. (4 7 88)

LRB-P-I-690 - LRB/ET interfaces can cause or be jeopardized by heat sources during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is analyzed as I-545 and B-691. (4 7 88)

LRB-P-I-691 - LRB/ET interfaces can cause or be jeopardized by heat sources during separation of the LRB from the STS vehicle. -- This hazard is analyzed as I-545 and B-691. (4 7 88)

LRB-P-I-692 - LRB/ET interfaces can cause or be jeopardized by heat sources during descent from separation to ocean impact. -- This hazard is not credible. (4 7 88)

LRB-P-I-693 - LRB/ET interfaces can cause or be jeopardized by heat sources during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 7 88)

LRB-P-I-694 - LRB/ET interfaces can cause or be jeopardized by heat sources during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 7 88)

LRB-P-I-695 - LRB/ET interfaces can cause or be jeopardized by heat sources during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-696 - LRB/ET interfaces can cause or be jeopardized by heat sources during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-745 - LRB/ET interfaces can cause or be jeopardized by electrical system malfunction during component or material purchase, including acquisition of GFP. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-746 - LRB/ET interfaces can cause or be jeopardized by electrical system malfunction during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-747 - LRB/ET interfaces can cause or be jeopardized by electrical system malfunction during inspection and test of the LRB and subsystems. -- This hazard is analyzed as E-747 and E-891. (4 7 88)

LRB-P-I-748 - LRB/ET interfaces can cause or be jeopardized by electrical system malfunction during proof test of pressure vessels and structure. -- This hazard is analyzed as G-748. (4 7 88)

LRB-P-I-749 - LRB/ET interfaces can cause or be jeopardized by electrical system malfunction during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-750 - LRB/ET interfaces can cause or be jeopardized by electrical system malfunction during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-751 - LRB/ET interfaces can cause or be jeopardized by electrical system malfunction during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-752 - LRB/ET interfaces can cause or be jeopardized by electrical system malfunction during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-754 - LRB/ET interfaces can cause or be jeopardized by electrical system malfunction during storage, including storage of major components. -- This hazard is

associated with I-753; essentially the same considerations apply. (4 7 88)

LRB-P-I-755 - LRB/ET interfaces can cause or be jeopardized by electrical system malfunction during preflight checkout prior to stacking. -- This hazard is analyzed as E-747. (4 7 88)

LRB-P-I-756 - LRB/ET interfaces can cause or be jeopardized by electrical system malfunction during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-757 - LRB/ET interfaces can cause or be jeopardized by electrical system malfunction during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-758 - LRB/ET interfaces can cause or be jeopardized by electrical system malfunction during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-759 - LRB/ET interfaces can cause or be jeopardized by electrical system malfunction during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-760 - LRB/ET interfaces can cause or be jeopardized by electrical system malfunction during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-761 - LRB/ET interfaces can cause or be jeopardized by electrical system malfunction during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-762 - LRB/ET interfaces can cause or be jeopardized by electrical system malfunction during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-763 - LRB/ET interfaces can cause or be jeopardized by electrical system malfunction during separation of the LRB from the STS vehicle. -- This hazard is analyzed as E-763 and E-1027. (4 7 88)

LRB-P-I-764 - LRB/ET interfaces can cause or be jeopardized by electrical system malfunction during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-765 - LRB/ET interfaces can cause or be jeopardized by electrical system malfunction during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-766 - LRB/ET interfaces can cause or be jeopardized by electrical system malfunction during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 7 88)

LRB-P-I-767 - LRB/ET interfaces can cause or be jeopardized by electrical system malfunction during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-768 - LRB/ET interfaces can cause or be jeopardized by electrical system malfunction during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-769 - LRB/ET interfaces can cause or be jeopardized by differential pressure during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (4 7 88)

LRB-P-I-770 - LRB/ET interfaces can cause or be jeopardized by differential pressure during manufacture and fabrication of subsystems and components. -- This hazard is not credible. (4 7 88)

LRB-P-I-771 - LRB/ET interfaces can cause or be jeopardized by differential pressure during inspection and test of the LRB and subsystems. -- This hazard is not credible. (4 7 88)

LRB-P-I-772 - LRB/ET interfaces can cause or be jeopardized by differential pressure during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-773 - LRB/ET interfaces can cause or be jeopardized by differential pressure during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-774 - LRB/ET interfaces can cause or be jeopardized by differential pressure during test firing of engines and/or the completed booster. -- This hazard is not credible. (4 7 88)

LRB-P-I-775 - LRB/ET interfaces can cause or be jeopardized by differential pressure during flight readiness firing (FRF) of the STS vehicle. -- This hazard is not credible. (4 7 88)

LRB-P-I-776 - LRB/ET interfaces can cause or be jeopardized by differential pressure during preparation for shipment of the booster and ship loose hardware. -- This hazard is not credible. (4 7 88)

LRB-P-I-777 - LRB/ET interfaces can cause or be jeopardized by differential pressure during transportation from manufacture to launch site or after recovery. --

This hazard is not credible. (4 7 88)

LRB-P-I-778 - LRB/ET interfaces can cause or be jeopardized by differential pressure during storage, including storage of major components. -- This hazard is not credible. (4 7 88)

LRB-P-I-779 - LRB/ET interfaces can cause or be jeopardized by differential pressure during preflight checkout prior to stacking. -- This hazard is not credible. (4 7 88)

LRB-P-I-780 - LRB/ET interfaces can cause or be jeopardized by differential pressure during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (4 7 88)

LRB-P-I-781 - LRB/ET interfaces can cause or be jeopardized by differential pressure during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 7 88)

LRB-P-I-782 - LRB/ET interfaces can cause or be jeopardized by differential pressure during propellant loading for test or flight. -- This hazard is not credible. (4 7 88)

LRB-P-I-783 - LRB/ET interfaces can cause or be jeopardized by differential pressure during countdown to liftoff or abort. -- This hazard is not credible. (4 7 88)

LRB-P-I-784 - LRB/ET interfaces can cause or be jeopardized by differential pressure during launch abort activities, including mission postponement (scrub). -- This hazard is not credible. (4 7 88)

LRB-P-I-785 - LRB/ET interfaces can cause or be jeopardized by differential pressure during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (4 7 88)

LRB-P-I-786 - LRB/ET interfaces can cause or be jeopardized by differential pressure during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (4 7 88)

LRB-P-I-787 - LRB/ET interfaces can cause or be jeopardized by differential pressure during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 7 88)

LRB-P-I-788 - LRB/ET interfaces can cause or be jeopardized by differential pressure during descent from separation to ocean impact. -- This hazard is not credible. (4 7 88)

LRB-P-I-789 - LRB/ET interfaces can cause or be jeopardized by differential

pressure during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 7 88)

LRB-P-I-790 - LRB/ET interfaces can cause or be jeopardized by differential pressure during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 7 88)

LRB-P-I-791 - LRB/ET interfaces can cause or be jeopardized by differential pressure during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (4 7 88)

LRB-P-I-792 - LRB/ET interfaces can cause or be jeopardized by differential pressure during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-793 - LRB/ET interfaces can cause or be jeopardized by vibration, acoustic loads or shock during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (4 7 88)

LRB-P-I-794 - LRB/ET interfaces can cause or be jeopardized by vibration, acoustic loads or shock during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-795 - LRB/ET interfaces can cause or be jeopardized by vibration, acoustic loads or shock during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-796 - LRB/ET interfaces can cause or be jeopardized by vibration, acoustic loads or shock during proof test of pressure vessels and structure. -- This hazard is analyzed as G-748. (4 7 88)

LRB-P-I-797 - LRB/ET interfaces can cause or be jeopardized by vibration, acoustic loads or shock during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-798 - LRB/ET interfaces can cause or be jeopardized by vibration, acoustic loads or shock during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-799 - LRB/ET interfaces can cause or be jeopardized by vibration, acoustic loads or shock during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-800 - LRB/ET interfaces can cause or be jeopardized by vibration, acoustic loads or shock during preparation for shipment of the booster and ship loose

hardware. -- This hazard is not credible. (4 7 88)

LRB-P-I-801 - LRB/ET interfaces can cause or be jeopardized by vibration, acoustic loads or shock during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-802 - LRB/ET interfaces can cause or be jeopardized by vibration, acoustic loads or shock during storage, including storage of major components. -- This hazard is not credible. (4 7 88)

LRB-P-I-803 - LRB/ET interfaces can cause or be jeopardized by vibration, acoustic loads or shock during preflight checkout prior to stacking. -- This hazard is not credible. (4 7 88)

LRB-P-I-804 - LRB/ET interfaces can cause or be jeopardized by vibration, acoustic loads or shock during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (4 7 88)

LRB-P-I-805 - LRB/ET interfaces can cause or be jeopardized by vibration, acoustic loads or shock during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 7 88)

LRB-P-I-806 - LRB/ET interfaces can cause or be jeopardized by vibration, acoustic loads or shock during propellant loading for test or flight. -- This hazard is not credible. (4 7 88)

LRB-P-I-807 - LRB/ET interfaces can cause or be jeopardized by vibration, acoustic loads or shock during countdown to liftoff or abort. -- This hazard is not credible. (4 7 88)

LRB-P-I-808 - LRB/ET interfaces can cause or be jeopardized by vibration, acoustic loads or shock during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-809 - LRB/ET interfaces can cause or be jeopardized by vibration, acoustic loads or shock during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-810 - LRB/ET interfaces can cause or be jeopardized by vibration, acoustic loads or shock during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-811 - LRB/ET interfaces can cause or be jeopardized by vibration, acoustic loads or shock during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-812 - LRB/ET interfaces can cause or be jeopardized by vibration, acoustic loads or shock during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-813 - LRB/ET interfaces can cause or be jeopardized by vibration, acoustic loads or shock during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-814 - LRB/ET interfaces can cause or be jeopardized by vibration, acoustic loads or shock during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 7 88)

LRB-P-I-815 - LRB/ET interfaces can cause or be jeopardized by vibration, acoustic loads or shock during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (4 7 88)

LRB-P-I-816 - LRB/ET interfaces can cause or be jeopardized by vibration, acoustic loads or shock during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-817 - LRB/ET interfaces can cause or be jeopardized by structural loads during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (4 7 88)

LRB-P-I-818 - LRB/ET interfaces can cause or be jeopardized by structural loads during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-819 - LRB/ET interfaces can cause or be jeopardized by structural loads during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-820 - LRB/ET interfaces can cause or be jeopardized by structural loads during proof test of pressure vessels and structure. -- This hazard is analyzed as G-748. (4 7 88)

LRB-P-I-821 - LRB/ET interfaces can cause or be jeopardized by structural loads during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (4 7 88)

LRB-P-I-822 - LRB/ET interfaces can cause or be jeopardized by structural loads during test firing of engines and/or the completed booster. -- Insofar as it applies, this hazard is related to I-535. (4 7 88)

LRB-P-I-823 - LRB/ET interfaces can cause or be jeopardized by structural loads

during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as F-823. (4 20 88)

LRB-P-I-824 - LRB/ET interfaces can cause or be jeopardized by structural loads during preparation for shipment of the booster and ship loose hardware. -- This hazard is not credible. (4 7 88)

LRB-P-I-825 - LRB/ET interfaces can cause or be jeopardized by structural loads during transportation from manufacture to launch site or after recovery. -- It is likely that the LRB will be moved by a transporter which interfaces to the LRB/ET attach fittings. However, it is assumed that these will be designed to withstand all loads likely to be encountered with sufficient safety margin that this hazard can be regarded as non-credible. (4 7 88)

LRB-P-I-826 - LRB/ET interfaces can cause or be jeopardized by structural loads during storage, including storage of major components. -- This hazard is not credible. (4 7 88)

LRB-P-I-827 - LRB/ET interfaces can cause or be jeopardized by structural loads during preflight checkout prior to stacking. -- Activities in the VAB are assumed to be conducted in such a manner that the LRB will not be jeopardized by structural loads. (4 7 88)

LRB-P-I-828 - LRB/ET interfaces can cause or be jeopardized by structural loads during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (4 7 88)

LRB-P-I-829 - LRB/ET interfaces can cause or be jeopardized by structural loads during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 7 88)

LRB-P-I-830 - LRB/ET interfaces can cause or be jeopardized by structural loads during propellant loading for test or flight. -- See hazard I-535. (4 7 88)

LRB-P-I-831 - LRB/ET interfaces can cause or be jeopardized by structural loads during countdown to liftoff or abort. -- See Hazard I-535. (4 7 88)

LRB-P-I-832 - LRB/ET interfaces can cause or be jeopardized by structural loads during launch abort activities, including mission postponement (scrub). -- This hazard is not credible. (4 7 88)

LRB-P-I-833 - LRB/ET interfaces can cause or be jeopardized by structural loads during nominal flight from liftoff to LRB burnout. -- Since this is the design condition, this hazard is assumed not to be credible. (4 7 88)

LRB-P-I-834 - LRB/ET interfaces can cause or be jeopardized by structural loads

during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-835 - LRB/ET interfaces can cause or be jeopardized by structural loads during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-836 - LRB/ET interfaces can cause or be jeopardized by structural loads during descent from separation to ocean impact. -- This hazard is not credible. (4 7 88)

LRB-P-I-837 - LRB/ET interfaces can cause or be jeopardized by structural loads during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 7 88)

LRB-P-I-838 - LRB/ET interfaces can cause or be jeopardized by structural loads during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 7 88)

LRB-P-I-839 - LRB/ET interfaces can cause or be jeopardized by structural loads during recovery activities, including towing, and retrieval of recoverables. -- It is assumed that recovery activities will involve hoisting and handling by tools which attach to the LRB/ET attach fittings, and that adequate margins of safety will be provided. (4 7 88)

LRB-P-I-840 - LRB/ET interfaces can cause or be jeopardized by structural loads during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-889 - LRB/ET interfaces can cause or be jeopardized by lightning or electromagnetic discharge during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (4 7 88)

LRB-P-I-890 - LRB/ET interfaces can cause or be jeopardized by lightning or electromagnetic discharge during manufacture and fabrication of subsystems and components. -- This hazard is not credible. (4 7 88)

LRB-P-I-891 - LRB/ET interfaces can cause or be jeopardized by lightning or electromagnetic discharge during inspection and test of the LRB and subsystems. -- This hazard is analyzed as E-891. (4 7 88)

LRB-P-I-892 - LRB/ET interfaces can cause or be jeopardized by lightning or electromagnetic discharge during proof test of pressure vessels and structure. -- To the extent that lightning could jeopardize the electrical system or computer controlled equipment in the test facility, this hazard is analyzed as G-748. (4 7 88)

LRB-P-I-893 - LRB/ET interfaces can cause or be jeopardized by lightning or electromagnetic discharge during acceptance test and checkout prior to delivery to the Government. -- To the extent that lightning can damage electrical test equipment, this hazard is analyzed as E-747. (4 7 88)

LRB-P-I-894 - LRB/ET interfaces can cause or be jeopardized by lightning or electromagnetic discharge during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-895 - LRB/ET interfaces can cause or be jeopardized by lightning or electromagnetic discharge during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-896 - LRB/ET interfaces can cause or be jeopardized by lightning or electromagnetic discharge during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-897 - LRB/ET interfaces can cause or be jeopardized by lightning or electromagnetic discharge during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-898 - LRB/ET interfaces can cause or be jeopardized by lightning or electromagnetic discharge during storage, including storage of major components. -- This hazard is not credible. (4 7 88)

LRB-P-I-899 - LRB/ET interfaces can cause or be jeopardized by lightning or electromagnetic discharge during preflight checkout prior to stacking. -- This hazard is not credible. (4 7 88)

LRB-P-I-900 - LRB/ET interfaces can cause or be jeopardized by lightning or electromagnetic discharge during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (4 7 88)

LRB-P-I-901 - LRB/ET interfaces can cause or be jeopardized by lightning or electromagnetic discharge during rollout from the VAB and preloading preparation. -- Since the LRBs will be grounded to the MLP structure, lightning currents from strikes on the ET or Orbiter during rollout will pass through the LRB/ET interface structure. It is assume that the interfaces will be designed to withstand these currents without damage. (4 7 88)

LRB-P-I-902 - LRB/ET interfaces can cause or be jeopardized by lightning or electromagnetic discharge during propellant loading for test or flight. -- See the comment for I-901. (4 7 88)

LRB-P-I-903 - LRB/ET interfaces can cause or be jeopardized by lightning or electromagnetic discharge during countdown to liftoff or abort. -- See the comment for I-901. (4 7 88)

LRB-P-I-904 - LRB/ET interfaces can cause or be jeopardized by lightning or electromagnetic discharge during launch abort activities, including mission postponement (scrub). -- See the comment for I-901. (4 7 88)

LRB-P-I-905 - LRB/ET interfaces can cause or be jeopardized by lightning or electromagnetic discharge during nominal flight from liftoff to LRB burnout. -- It is assumed that the interfaces will be designed to withstand lightning strike. (4 7 88)

LRB-P-I-906 - LRB/ET interfaces can cause or be jeopardized by lightning or electromagnetic discharge during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-907 - LRB/ET interfaces can cause or be jeopardized by lightning or electromagnetic discharge during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-909 - LRB/ET interfaces can cause or be jeopardized by lightning or electromagnetic discharge during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-910 - LRB/ET interfaces can cause or be jeopardized by lightning or electromagnetic discharge during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-911 - LRB/ET interfaces can cause or be jeopardized by lightning or electromagnetic discharge during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-912 - LRB/ET interfaces can cause or be jeopardized by lightning or electromagnetic discharge during refurbishment of reusable components. -- This hazard is not credible. (4 7 88)

LRB-P-I-913 - LRB/ET interfaces can cause or be jeopardized by faulty documentation during component or material purchase, including acquisition of GFP. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-914 - LRB/ET interfaces can cause or be jeopardized by faulty documentation during manufacture and fabrication of subsystems and components. -- This hazard has to do with faulty manufacturing process plans, and cannot be adequately analyzed at this time. (4 7 88)

LRB-P-I-915 - LRB/ET interfaces can cause or be jeopardized by faulty documentation during inspection and test of the LRB and subsystems. -- This hazard has to do with inspection documentation (OMRSD and OMI), which will require complete revision for LRB inspection and test. (4 7 88)

LRB-P-I-916 - LRB/ET interfaces can cause or be jeopardized by faulty documentation during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-917 - LRB/ET interfaces can cause or be jeopardized by faulty documentation during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-918 - LRB/ET interfaces can cause or be jeopardized by faulty documentation during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-919 - LRB/ET interfaces can cause or be jeopardized by faulty documentation during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-920 - LRB/ET interfaces can cause or be jeopardized by faulty documentation during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-921 - LRB/ET interfaces can cause or be jeopardized by faulty documentation during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-922 - LRB/ET interfaces can cause or be jeopardized by faulty documentation during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-923 - LRB/ET interfaces can cause or be jeopardized by faulty documentation during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-924 - LRB/ET interfaces can cause or be jeopardized by faulty documentation during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-925 - LRB/ET interfaces can cause or be jeopardized by faulty documentation during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-926 - LRB/ET interfaces can cause or be jeopardized by faulty documentation during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-927 - LRB/ET interfaces can cause or be jeopardized by faulty documentation during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-928 - LRB/ET interfaces can cause or be jeopardized by faulty documentation during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-929 - LRB/ET interfaces can cause or be jeopardized by faulty documentation during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-930 - LRB/ET interfaces can cause or be jeopardized by faulty documentation during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-931 - LRB/ET interfaces can cause or be jeopardized by faulty documentation during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 7 88)

LRB-P-I-932 - LRB/ET interfaces can cause or be jeopardized by faulty documentation during descent from separation to ocean impact. -- This hazard is not credible. (4 7 88)

LRB-P-I-933 - LRB/ET interfaces can cause or be jeopardized by faulty documentation during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 7 88)

LRB-P-I-934 - LRB/ET interfaces can cause or be jeopardized by faulty documentation during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 7 88)

LRB-P-I-935 - LRB/ET interfaces can cause or be jeopardized by faulty documentation during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-936 - LRB/ET interfaces can cause or be jeopardized by faulty documentation during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-961 - LRB/ET interfaces can cause or be jeopardized by computer system

malfunction during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (4 7 88)

LRB-P-I-962 - LRB/ET interfaces can cause or be jeopardized by computer system malfunction during manufacture and fabrication of subsystems and components. -- This hazard pertains to computer-controlled manufacturing and test equipment and cannot be evaluated at this time. (4 7 88)

LRB-P-I-963 - LRB/ET interfaces can cause or be jeopardized by computer system malfunction during inspection and test of the LRB and subsystems. -- This hazard is analyzed as E-963. (4 7 88)

LRB-P-I-964 - LRB/ET interfaces can cause or be jeopardized by computer system malfunction during proof test of pressure vessels and structure. -- This hazard is analyzed as G-748. (4 7 88)

LRB-P-I-965 - LRB/ET interfaces can cause or be jeopardized by computer system malfunction during acceptance test and checkout prior to delivery to the Government. -- This hazard is analyzed as E-961. (4 7 88)

LRB-P-I-966 - LRB/ET interfaces can cause or be jeopardized by computer system malfunction during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-967 - LRB/ET interfaces can cause or be jeopardized by computer system malfunction during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as E-967. (4 7 88)

LRB-P-I-968 - LRB/ET interfaces can cause or be jeopardized by computer system malfunction during preparation for shipment of the booster and ship loose hardware. -- This hazard is analyzed as G-753. (4 7 88)

LRB-P-I-969 - LRB/ET interfaces can cause or be jeopardized by computer system malfunction during transportation from manufacture to launch site or after recovery. -- This hazard is analyzed as I-753. (4 7 88)

LRB-P-I-970 - LRB/ET interfaces can cause or be jeopardized by computer system malfunction during storage, including storage of major components. -- This hazard is not credible. (4 7 88)

LRB-P-I-971 - LRB/ET interfaces can cause or be jeopardized by computer system malfunction during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-972 - LRB/ET interfaces can cause or be jeopardized by computer system malfunction during vehicle stacking, including ancillary test activities. -- At the current

state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-973 - LRB/ET interfaces can cause or be jeopardized by computer system malfunction during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-974 - LRB/ET interfaces can cause or be jeopardized by computer system malfunction during propellant loading for test or flight. -- This hazard is analyzed as E-967. (4 7 88)

LRB-P-I-975 - LRB/ET interfaces can cause or be jeopardized by computer system malfunction during countdown to liftoff or abort. -- This hazard is analyzed as E-967. (4 7 88)

LRB-P-I-976 - LRB/ET interfaces can cause or be jeopardized by computer system malfunction during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as E-967. (4 7 88)

LRB-P-I-977 - LRB/ET interfaces can cause or be jeopardized by computer system malfunction during nominal flight from liftoff to LRB burnout. -- This hazard is analyzed as E-977. (4 7 88)

LRB-P-I-978 - LRB/ET interfaces can cause or be jeopardized by computer system malfunction during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is analyzed as E-977. (4 7 88)

LRB-P-I-979 - LRB/ET interfaces can cause or be jeopardized by computer system malfunction during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-980 - LRB/ET interfaces can cause or be jeopardized by computer system malfunction during descent from separation to ocean impact. -- This hazard is not credible. (4 7 88)

LRB-P-I-981 - LRB/ET interfaces can cause or be jeopardized by computer system malfunction during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 7 88)

LRB-P-I-982 - LRB/ET interfaces can cause or be jeopardized by computer system malfunction during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 7 88)

LRB-P-I-983 - LRB/ET interfaces can cause or be jeopardized by computer system malfunction during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (4 7 88)

LRB-P-I-984 - LRB/ET interfaces can cause or be jeopardized by computer system malfunction during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-985 - LRB/ET interfaces can cause or be jeopardized by operator error during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (4 7 88)

LRB-P-I-986 - LRB/ET interfaces can cause or be jeopardized by operator error during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-987 - LRB/ET interfaces can cause or be jeopardized by operator error during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-988 - LRB/ET interfaces can cause or be jeopardized by operator error during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-989 - LRB/ET interfaces can cause or be jeopardized by operator error during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-990 - LRB/ET interfaces can cause or be jeopardized by operator error during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-991 - LRB/ET interfaces can cause or be jeopardized by operator error during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-992 - LRB/ET interfaces can cause or be jeopardized by operator error during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-993 - LRB/ET interfaces can cause or be jeopardized by operator error during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-994 - LRB/ET interfaces can cause or be jeopardized by operator error during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-995 - LRB/ET interfaces can cause or be jeopardized by operator error during preflight checkout prior to stacking. -- At the current state of maturity, this

hazard cannot be evaluated. (4 7 88)

LRB-P-I-996 - LRB/ET interfaces can cause or be jeopardized by operator error during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-997 - LRB/ET interfaces can cause or be jeopardized by operator error during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-998 - LRB/ET interfaces can cause or be jeopardized by operator error during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-999 - LRB/ET interfaces can cause or be jeopardized by operator error during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-1000 - LRB/ET interfaces can cause or be jeopardized by operator error during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-1001 - LRB/ET interfaces can cause or be jeopardized by operator error during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (4 7 88)

LRB-P-I-1002 - LRB/ET interfaces can cause or be jeopardized by operator error during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (4 7 88)

LRB-P-I-1003 - LRB/ET interfaces can cause or be jeopardized by operator error during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 7 88)

LRB-P-I-1004 - LRB/ET interfaces can cause or be jeopardized by operator error during descent from separation to ocean impact. -- This hazard is not credible. (4 7 88)

LRB-P-I-1005 - LRB/ET interfaces can cause or be jeopardized by operator error during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 7 88)

LRB-P-I-1006 - LRB/ET interfaces can cause or be jeopardized by operator error during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 7 88)

LRB-P-I-1007 - LRB/ET interfaces can cause or be jeopardized by operator error during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-1008 - LRB/ET interfaces can cause or be jeopardized by operator error during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-1033 - LRB/ET interfaces can cause or be jeopardized by emergencies during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (4 7 88)

LRB-P-I-1034 - LRB/ET interfaces can cause or be jeopardized by emergencies during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-1035 - LRB/ET interfaces can cause or be jeopardized by emergencies during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-1036 - LRB/ET interfaces can cause or be jeopardized by emergencies during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-1037 - LRB/ET interfaces can cause or be jeopardized by emergencies during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-1038 - LRB/ET interfaces can cause or be jeopardized by emergencies during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-1039 - LRB/ET interfaces can cause or be jeopardized by emergencies during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-1040 - LRB/ET interfaces can cause or be jeopardized by emergencies during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-1041 - LRB/ET interfaces can cause or be jeopardized by emergencies during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-1042 - LRB/ET interfaces can cause or be jeopardized by emergencies during storage, including storage of major components. -- At the current state of

maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-1043 - LRB/ET interfaces can cause or be jeopardized by emergencies during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-1044 - LRB/ET interfaces can cause or be jeopardized by emergencies during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-1045 - LRB/ET interfaces can cause or be jeopardized by emergencies during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-1046 - LRB/ET interfaces can cause or be jeopardized by emergencies during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-1047 - LRB/ET interfaces can cause or be jeopardized by emergencies during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-1048 - LRB/ET interfaces can cause or be jeopardized by emergencies during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-1049 - LRB/ET interfaces can cause or be jeopardized by emergencies during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-1050 - LRB/ET interfaces can cause or be jeopardized by emergencies during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-1051 - LRB/ET interfaces can cause or be jeopardized by emergencies during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-1052 - LRB/ET interfaces can cause or be jeopardized by emergencies during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-1053 - LRB/ET interfaces can cause or be jeopardized by emergencies during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-1054 - LRB/ET interfaces can cause or be jeopardized by emergencies during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-1055 - LRB/ET interfaces can cause or be jeopardized by emergencies during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

LRB-P-I-1056 - LRB/ET interfaces can cause or be jeopardized by emergencies during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 7 88)

THESE HAZARDS WERE CONSIDERED BY THE ANALYST BUT WERE NOT FURTHER ANALYZED FOR THE REASONS GIVEN

LRB-P-J-535 - The ET and components can cause or be jeopardized by hazardous environments during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as I-535. (4 8 88)

LRB-P-J-540 - The ET and components can cause or be jeopardized by hazardous environments during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 8 88)

LRB-P-J-541 - The ET and components can cause or be jeopardized by hazardous environments during rollout from the VAB and preloading preparation. -- The environments to which the ET will be subject will be essentially the same as those now encountered. (4 8 88)

LRB-P-J-542 - The ET and components can cause or be jeopardized by hazardous environments during propellant loading for test or flight. -- This hazard is analyzed as I-542 for the LRB interfaces. Hazards to the ET would be caused by damaged ET TPS, and so are properly ET hazards. (4 8 88)

LRB-P-J-543 - The ET and components can cause or be jeopardized by hazardous environments during countdown to liftoff or abort. -- This hazard is analyzed as I-543. (4 8 88)

LRB-P-J-544 - The ET and components can cause or be jeopardized by hazardous environments during launch abort activities, including mission postponement (scrub). -- This hazard is essentially the same as J-543, which is analyzed as I-543. (4 8 88)

LRB-P-J-545 - The ET and components can cause or be jeopardized by hazardous environments during nominal flight from liftoff to LRB burnout. -- This hazard is analyzed as I-545. (4 8 88)

LRB-P-J-546 - The ET and components can cause or be jeopardized by hazardous environments during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 8 88)

LRB-P-J-547 - The ET and components can cause or be jeopardized by hazardous environments during separation of the LRB from the STS vehicle. -- This hazard is analyzed as B-547. (4 8 88)

LRB-P-J-548 - The ET and components can cause or be jeopardized by hazardous environments during descent from separation to ocean impact. -- This hazard is not credible. (4 8 88)

LRB-P-J-684 - The ET and components can cause or be jeopardized by heat

sources during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (4 8 88)

LRB-P-J-685 - The ET and components can cause or be jeopardized by heat sources during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 8 88)

LRB-P-J-686 - The ET and components can cause or be jeopardized by heat sources during propellant loading for test or flight. -- The LRB is not likely to produce appreciable heat sources during loading. (4 8 88)

LRB-P-J-687 - The ET and components can cause or be jeopardized by heat sources during countdown to liftoff or abort. -- This hazard is not credible. (4 8 88)

LRB-P-J-688 - The ET and components can cause or be jeopardized by heat sources during launch abort activities, including mission postponement (scrub). -- To the extent to which it applies, this hazard is analyzed as J-679. (4 8 88)

LRB-P-J-689 - The ET and components can cause or be jeopardized by heat sources during nominal flight from liftoff to LRB burnout. -- Since this condition is the design condition and LRBs are not likely to generate significantly greater radiant heat loads than the SRBs, this hazard does not appear to be credible. (4 8 88)

LRB-P-J-690 - The ET and components can cause or be jeopardized by heat sources during intact abort, including RTLS, TAL, AOA and ATO. -- See the comment for J-689. (4 8 88)

LRB-P-J-691 - The ET and components can cause or be jeopardized by heat sources during separation of the LRB from the STS vehicle. -- This hazard is analyzed as B-691. (4 8 88)

LRB-P-J-692 - The ET and components can cause or be jeopardized by heat sources during descent from separation to ocean impact. -- This hazard is not related to the LRBs. (4 8 88)

LRB-P-J-804 - The ET and components can cause or be jeopardized by vibration, acoustic loads or shock during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (4 8 88)

LRB-P-J-805 - The ET and components can cause or be jeopardized by vibration, acoustic loads or shock during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 8 88)

LRB-P-J-806 - The ET and components can cause or be jeopardized by vibration, acoustic loads or shock during propellant loading for test or flight. -- This hazard is not credible. (4 8 88)

LRB-P-J-807 - The ET and components can cause or be jeopardized by vibration, acoustic loads or shock during countdown to liftoff or abort. -- This hazard is not credible. (4 8 88)

LRB-P-J-808 - The ET and components can cause or be jeopardized by vibration, acoustic loads or shock during launch abort activities, including mission postponement (scrub). -- To the extent to which it applies, this hazard is analyzed as J-799. (4 8 88)

LRB-P-J-809 - The ET and components can cause or be jeopardized by vibration, acoustic loads or shock during nominal flight from liftoff to LRB burnout. -- This hazard is analyzed as J-799. (4 8 88)

LRB-P-J-810 - The ET and components can cause or be jeopardized by vibration, acoustic loads or shock during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is analyzed as J-799. (4 8 88)

LRB-P-J-811 - The ET and components can cause or be jeopardized by vibration, acoustic loads or shock during separation of the LRB from the STS vehicle. -- This hazard is analyzed as B-547. (4 8 88)

LRB-P-J-812 - The ET and components can cause or be jeopardized by vibration, acoustic loads or shock during descent from separation to ocean impact. -- This hazard is not credible. (4 8 88)

LRB-P-J-847 - The ET and components can cause or be jeopardized by leaks during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as I-543. (4 8 88)

LRB-P-J-852 - The ET and components can cause or be jeopardized by leaks during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (4 8 88)

LRB-P-J-853 - The ET and components can cause or be jeopardized by leaks during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 8 88)

LRB-P-J-854 - The ET and components can cause or be jeopardized by leaks during propellant loading for test or flight. -- This hazard is analyzed as I-543. (4 8 88)

LRB-P-J-855 - The ET and components can cause or be jeopardized by leaks during countdown to liftoff or abort. -- This hazard is analyzed as I-543. (4 8 88)

LRB-P-J-856 - The ET and components can cause or be jeopardized by leaks during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as I-543. (4 8 88)

LRB-P-J-857 - The ET and components can cause or be jeopardized by leaks during nominal flight from liftoff to LRB burnout. -- This hazard is analyzed as I-545. (4 8 88)

LRB-P-J-858 - The ET and components can cause or be jeopardized by leaks during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is analyzed as I-545. (4 8 88)

LRB-P-J-859 - The ET and components can cause or be jeopardized by leaks during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 8 88)

LRB-P-J-860 - The ET and components can cause or be jeopardized by leaks during descent from separation to ocean impact. -- This hazard is not credible. (4 8 88)

LRB-P-J-943 - The ET and components can cause or be jeopardized by chemical activity during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 8 88)

LRB-P-J-948 - The ET and components can cause or be jeopardized by chemical activity during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 8 88)

LRB-P-J-949 - The ET and components can cause or be jeopardized by chemical activity during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 8 88)

LRB-P-J-950 - The ET and components can cause or be jeopardized by chemical activity during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 8 88)

LRB-P-J-951 - The ET and components can cause or be jeopardized by chemical activity during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 8 88)

LRB-P-J-952 - The ET and components can cause or be jeopardized by chemical activity during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 8 88)

LRB-P-J-953 - The ET and components can cause or be jeopardized by chemical activity during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 8 88)

LRB-P-J-954 - The ET and components can cause or be jeopardized by chemical activity during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 8 88)

LRB-P-J-955 - The ET and components can cause or be jeopardized by chemical activity during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 8 88)

LRB-P-J-956 - The ET and components can cause or be jeopardized by chemical activity during descent from separation to ocean impact. -- This hazard is not credible. (4 8 88)

LRB-P-J-991 - The ET and components can cause or be jeopardized by operator error during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 8 88)

LRB-P-J-996 - The ET and components can cause or be jeopardized by operator error during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 8 88)

LRB-P-J-997 - The ET and components can cause or be jeopardized by operator error during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 8 88)

LRB-P-J-998 - The ET and components can cause or be jeopardized by operator error during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 8 88)

LRB-P-J-999 - The ET and components can cause or be jeopardized by operator error during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 8 88)

LRB-P-J-1000 - The ET and components can cause or be jeopardized by operator error during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 8 88)

LRB-P-J-1001 - The ET and components can cause or be jeopardized by operator error during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 8 88)

LRB-P-J-1002 - The ET and components can cause or be jeopardized by operator error during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 8 88)

LRB-P-J-1003 - The ET and components can cause or be jeopardized by operator error during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 8 88)

LRB-P-J-1004 - The ET and components can cause or be jeopardized by operator error during descent from separation to ocean impact. -- This hazard is not credible. (4 8 88)

LRB-P-J-1039 - The ET and components can cause or be jeopardized by emergencies during flight readiness firing (FRF) of the STS vehicle. -- Any emergency involving the LRBs will likely involve the ET. However, at the present time it is not possible to evaluate the kinds and extent of credible emergencies with any degree of accuracy. (4 8 88)

LRB-P-J-1044 - The ET and components can cause or be jeopardized by emergencies during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 8 88)

LRB-P-J-1045 - The ET and components can cause or be jeopardized by emergencies during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 8 88)

LRB-P-J-1046 - The ET and components can cause or be jeopardized by emergencies during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 8 88)

LRB-P-J-1047 - The ET and components can cause or be jeopardized by emergencies during countdown to liftoff or abort. -- Any emergency occurring during countdown which affects the LRBs will likely affect the ET. However, at this time, it is not possible fully to analyze this hazard for possible corrective measures. (4 8 88)

LRB-P-J-1048 - The ET and components can cause or be jeopardized by emergencies during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 8 88)

LRB-P-J-1049 - The ET and components can cause or be jeopardized by emergencies during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 8 88)

LRB-P-J-1050 - The ET and components can cause or be jeopardized by emergencies during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 8 88)

LRB-P-J-1051 - The ET and components can cause or be jeopardized by emergencies during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 8 88)

LRB-P-J-1052 - The ET and components can cause or be jeopardized by emergencies during descent from separation to ocean impact. -- This hazard is not credible. (4 8 88)

THESE HAZARDS WERE CONSIDERED BY THE ANALYST BUT WERE NOT FURTHER ANALYZED FOR THE REASONS GIVEN

LRB-P-K-529 - Cryogenic tanks and systems can cause or be jeopardized by hazardous environments during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (4 10 88)

LRB-P-K-531 - Cryogenic tanks and systems can cause or be jeopardized by hazardous environments during inspection and test of the LRB and subsystems. -- Hazardous environments commonly associated with cryogenic systems are presumed to exist whenever cryogens are on board. These will be analyzed under separate catagories. (4 10 88)

LRB-P-K-532 - Cryogenic tanks and systems can cause or be jeopardized by hazardous environments during proof test of pressure vessels and structure. -- This hazard is analyzed as G-532. It is assumed that proot test will not involve the use of cryogens. Hazards associated with filament wound tanks which are specific to composite structures are not amenable to analysis at this time. (4 10 88)

LRB-P-K-533 - Cryogenic tanks and systems can cause or be jeopardized by hazardous environments during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-534 - Cryogenic tanks and systems can cause or be jeopardized by hazardous environments during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-535 - Cryogenic tanks and systems can cause or be jeopardized by hazardous environments during flight readiness firing (FRF) of the STS vehicle. -- These will be analyzed separately under the environmental hazard involved. (4 10 88)

LRB-P-K-536 - Cryogenic tanks and systems can cause or be jeopardized by hazardous environments during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-537 - Cryogenic tanks and systems can cause or be jeopardized by hazardous environments during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-538 - Cryogenic tanks and systems can cause or be jeopardized by hazardous environments during storage, including storage of major components. -- This hazard is not credible. (4 10 88)

LRB-P-K-539 - Cryogenic tanks and systems can cause or be jeopardized by hazardous environments during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-540 - Cryogenic tanks and systems can cause or be jeopardized by hazardous environments during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-541 - Cryogenic tanks and systems can cause or be jeopardized by hazardous environments during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-542 - Cryogenic tanks and systems can cause or be jeopardized by hazardous environments during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-543 - Cryogenic tanks and systems can cause or be jeopardized by hazardous environments during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-544 - Cryogenic tanks and systems can cause or be jeopardized by hazardous environments during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-545 - Cryogenic tanks and systems can cause or be jeopardized by hazardous environments during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-546 - Cryogenic tanks and systems can cause or be jeopardized by hazardous environments during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-547 - Cryogenic tanks and systems can cause or be jeopardized by hazardous environments during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-548 - Cryogenic tanks and systems can cause or be jeopardized by hazardous environments during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-549 - Cryogenic tanks and systems can cause or be jeopardized by hazardous environments during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-550 - Cryogenic tanks and systems can cause or be jeopardized by hazardous environments during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-551 - Cryogenic tanks and systems can cause or be jeopardized by hazardous environments during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-552 - Cryogenic tanks and systems can cause or be jeopardized by hazardous environments during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-577 - Cryogenic tanks and systems can cause or be jeopardized by unsafe or unhygienic working conditions during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (4 10 88)

LRB-P-K-578 - Cryogenic tanks and systems can cause or be jeopardized by unsafe or unhygienic working conditions during manufacture and fabrication of subsystems and components. -- This hazard is analyzed as K-530. (4 10 88)

LRB-P-K-580 - Cryogenic tanks and systems can cause or be jeopardized by unsafe or unhygienic working conditions during proof test of pressure vessels and structure. -- This hazard is analyzed as G-532. (4 10 88)

LRB-P-K-581 - Cryogenic tanks and systems can cause or be jeopardized by unsafe or unhygienic working conditions during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-582 - Cryogenic tanks and systems can cause or be jeopardized by unsafe or unhygienic working conditions during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-583 - Cryogenic tanks and systems can cause or be jeopardized by unsafe or unhygienic working conditions during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-584 - Cryogenic tanks and systems can cause or be jeopardized by unsafe or unhygienic working conditions during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-585 - Cryogenic tanks and systems can cause or be jeopardized by unsafe or unhygienic working conditions during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be

evaluated. (4 10 88)

LRB-P-K-586 - Cryogenic tanks and systems can cause or be jeopardized by unsafe or unhygienic working conditions during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-587 - Cryogenic tanks and systems can cause or be jeopardized by unsafe or unhygienic working conditions during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-588 - Cryogenic tanks and systems can cause or be jeopardized by unsafe or unhygienic working conditions during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-589 - Cryogenic tanks and systems can cause or be jeopardized by unsafe or unhygienic working conditions during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-590 - Cryogenic tanks and systems can cause or be jeopardized by unsafe or unhygienic working conditions during propellant loading for test or flight. -- This hazard is analyzed as K-579. (4 10 88)

LRB-P-K-591 - Cryogenic tanks and systems can cause or be jeopardized by unsafe or unhygienic working conditions during countdown to liftoff or abort. -- This hazard is analyzed as K-579. (4 10 88)

LRB-P-K-592 - Cryogenic tanks and systems can cause or be jeopardized by unsafe or unhygienic working conditions during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as K-579. (4 10 88)

LRB-P-K-593 - Cryogenic tanks and systems can cause or be jeopardized by unsafe or unhygienic working conditions during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (4 10 88)

LRB-P-K-594 - Cryogenic tanks and systems can cause or be jeopardized by unsafe or unhygienic working conditions during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (4 10 88)

LRB-P-K-595 - Cryogenic tanks and systems can cause or be jeopardized by unsafe or unhygienic working conditions during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 10 88)

LRB-P-K-596 - Cryogenic tanks and systems can cause or be jeopardized by unsafe

or unhygienic working conditions during descent from separation to ocean impact. -- This hazard is not credible. (4 10 88)

LRB-P-K-597 - Cryogenic tanks and systems can cause or be jeopardized by unsafe or unhygienic working conditions during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 10 88)

LRB-P-K-598 - Cryogenic tanks and systems can cause or be jeopardized by unsafe or unhygienic working conditions during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 10 88)

LRB-P-K-599 - Cryogenic tanks and systems can cause or be jeopardized by unsafe or unhygienic working conditions during recovery activities, including towing, and retrieval of recoverables. -- Recovery activities of boosters containing cryogen residuals will involve those hazards analyzed in K-579. (4 10 88)

LRB-P-K-600 - Cryogenic tanks and systems can cause or be jeopardized by unsafe or unhygienic working conditions during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-649 - Cryogenic tanks and systems can cause or be jeopardized by contamination during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (4 10 88)

LRB-P-K-651 - Cryogenic tanks and systems can cause or be jeopardized by contamination during inspection and test of the LRB and subsystems. -- This hazard is similar to that analyzed as K-650; similar considerations apply. (4 10 88)

LRB-P-K-652 - Cryogenic tanks and systems can cause or be jeopardized by contamination during proof test of pressure vessels and structure. -- It is assumed that the tanks will be pressurized with a fluid which is chemically compatible with the media to be stored and thoroughly dried prior to cryogenic loading. (4 10 88)

LRB-P-K-653 - Cryogenic tanks and systems can cause or be jeopardized by contamination during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-654 - Cryogenic tanks and systems can cause or be jeopardized by contamination during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-655 - Cryogenic tanks and systems can cause or be jeopardized by contamination during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-656 - Cryogenic tanks and systems can cause or be jeopardized by contamination during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-657 - Cryogenic tanks and systems can cause or be jeopardized by contamination during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-658 - Cryogenic tanks and systems can cause or be jeopardized by contamination during storage, including storage of major components. -- It is assumed that cryogenic tanks will be protected with breathers or pressurized dry gas during storage. (4 10 88)

LRB-P-K-659 - Cryogenic tanks and systems can cause or be jeopardized by contamination during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-660 - Cryogenic tanks and systems can cause or be jeopardized by contamination during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-661 - Cryogenic tanks and systems can cause or be jeopardized by contamination during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-662 - Cryogenic tanks and systems can cause or be jeopardized by contamination during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-663 - Cryogenic tanks and systems can cause or be jeopardized by contamination during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-664 - Cryogenic tanks and systems can cause or be jeopardized by contamination during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-665 - Cryogenic tanks and systems can cause or be jeopardized by contamination during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (4 10 88)

LRB-P-K-666 - Cryogenic tanks and systems can cause or be jeopardized by contamination during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (4 10 88)

LRB-P-K-667 - Cryogenic tanks and systems can cause or be jeopardized by contamination during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 10 88)

LRB-P-K-668 - Cryogenic tanks and systems can cause or be jeopardized by contamination during descent from separation to ocean impact. -- This hazard is not credible. (4 10 88)

LRB-P-K-669 - Cryogenic tanks and systems can cause or be jeopardized by contamination during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-670 - Cryogenic tanks and systems can cause or be jeopardized by contamination during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-671 - Cryogenic tanks and systems can cause or be jeopardized by contamination during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-672 - Cryogenic tanks and systems can cause or be jeopardized by contamination during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-673 - Cryogenic tanks and systems can cause or be jeopardized by heat sources during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (4 10 88)

LRB-P-K-675 - Cryogenic tanks and systems can cause or be jeopardized by heat sources during inspection and test of the LRB and subsystems. -- Any inspection which involves the application of heat is suspect. This hazard cannot be precisely evaluated at this time. (4 10 88)

LRB-P-K-676 - Cryogenic tanks and systems can cause or be jeopardized by heat sources during proof test of pressure vessels and structure. -- It is assumed that the proof test will not involve the application of heat to tanks or other portions of the cryogenic system. (4 10 88)

LRB-P-K-677 - Cryogenic tanks and systems can cause or be jeopardized by heat sources during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-678 - Cryogenic tanks and systems can cause or be jeopardized by heat sources during test firing of engines and/or the completed booster. -- Since the

design of tankage and the test firing facility will take into consideration any test firing which might be contemplated, this hazard does not appear to be credible. (4 10 88)

LRB-P-K-680 - Cryogenic tanks and systems can cause or be jeopardized by heat sources during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-681 - Cryogenic tanks and systems can cause or be jeopardized by heat sources during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-682 - Cryogenic tanks and systems can cause or be jeopardized by heat sources during storage, including storage of major components. -- This hazard is not credible. (4 10 88)

LRB-P-K-683 - Cryogenic tanks and systems can cause or be jeopardized by heat sources during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-684 - Cryogenic tanks and systems can cause or be jeopardized by heat sources during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-685 - Cryogenic tanks and systems can cause or be jeopardized by heat sources during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-686 - Cryogenic tanks and systems can cause or be jeopardized by heat sources during propellant loading for test or flight. -- Since this is a design condition, this hazard does not appear to be credible. (4 10 88)

LRB-P-K-687 - Cryogenic tanks and systems can cause or be jeopardized by heat sources during countdown to liftoff or abort. -- See comments for K-686. (4 10 88)

LRB-P-K-688 - Cryogenic tanks and systems can cause or be jeopardized by heat sources during launch abort activities, including mission postponement (scrub). -- Heat soak after an on-pad abort may lead to the condition analyzed as K-679. (4 10 88)

LRB-P-K-689 - Cryogenic tanks and systems can cause or be jeopardized by heat sources during nominal flight from liftoff to LRB burnout. -- Since this is the design condition, this hazard does not appear credible. (4 10 88)

LRB-P-K-690 - Cryogenic tanks and systems can cause or be jeopardized by heat sources during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (4 10 88)

LRB-P-K-691 - Cryogenic tanks and systems can cause or be jeopardized by heat sources during separation of the LRB from the STS vehicle. -- Booster separation motor impingement is an obvious concern. However, since this is a design condition, hazards from this source do not appear credible. (4 10 88)

LRB-P-K-692 - Cryogenic tanks and systems can cause or be jeopardized by heat sources during descent from separation to ocean impact. -- This hazard is not credible. (4 10 88)

LRB-P-K-693 - Cryogenic tanks and systems can cause or be jeopardized by heat sources during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-695 - Cryogenic tanks and systems can cause or be jeopardized by heat sources during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-696 - Cryogenic tanks and systems can cause or be jeopardized by heat sources during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 10 88)

LRB-P-K-721 - Cryogenic tanks and systems can cause or be jeopardized by moisture or precipitation during component or material purchase, including acquisition of GFP. -- If the tanks are supplied as GFP, the booster manufacturer may not be able to specify what kinds of records are supplied with the equipment. There may arise some question concerning the possibility of the tanks being contaminated or similar concerns which could not be resolved with the documentation available. At present, it is not possible to determine all the questions which might arise, or how they might be resolved. (4 11 88)

LRB-P-K-722 - Cryogenic tanks and systems can cause or be jeopardized by moisture or precipitation during manufacture and fabrication of subsystems and components. -- Although there could be a hazard associated with water remaining in the tanks after cleaning, this problem has been resolved by various techniques for a long time. Therefore, it may be assumed that this hazard will be adequately resolved. (4 11 88)

LRB-P-K-723 - Cryogenic tanks and systems can cause or be jeopardized by moisture or precipitation during inspection and test of the LRB and subsystems. -- Purge gasses must meet specifications for cleanliness and moisture. This does not appear to be a difficult requirement to meet; therefore the hazards associated with nonconformance may be assumed to be resolved. (4 11 88)

LRB-P-K-724 - Cryogenic tanks and systems can cause or be jeopardized by moisture or precipitation during proof test of pressure vessels and structure. -- It may be assumed that any hazards associated with proof test fluids remaining in the tanks

will be adequately resolved. (4 11 88)

LRB-P-K-725 - Cryogenic tanks and systems can cause or be jeopardized by moisture or precipitation during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 11 88)

LRB-P-K-726 - Cryogenic tanks and systems can cause or be jeopardized by moisture or precipitation during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 11 88)

LRB-P-K-727 - Cryogenic tanks and systems can cause or be jeopardized by moisture or precipitation during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as K-734. (4 11 88)

LRB-P-K-728 - Cryogenic tanks and systems can cause or be jeopardized by moisture or precipitation during preparation for shipment of the booster and ship loose hardware. -- The concern here is moisture intrusion while the booster is being transported. This hazard is analyzed as E-728. (4 11 88)

LRB-P-K-729 - Cryogenic tanks and systems can cause or be jeopardized by moisture or precipitation during transportation from manufacture to launch site or after recovery. -- This hazard is analyzed as E-728. (4 11 88)

LRB-P-K-730 - Cryogenic tanks and systems can cause or be jeopardized by moisture or precipitation during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (4 11 88)

LRB-P-K-731 - Cryogenic tanks and systems can cause or be jeopardized by moisture or precipitation during preflight checkout prior to stacking. -- It is assumed that the booster systems will be protected from moisture during preparation for flight. (4 11 88)

LRB-P-K-732 - Cryogenic tanks and systems can cause or be jeopardized by moisture or precipitation during vehicle stacking, including ancillary test activities. -- It is assumed that the booster will be protected from moisture during preparation for flight. (4 11 88)

LRB-P-K-733 - Cryogenic tanks and systems can cause or be jeopardized by moisture or precipitation during rollout from the VAB and preloading preparation. -- Since the booster will be in the vertical position during this time, it is assumed that drains will be configured to drain out water. However, there is a hazard associated with moisture intrusion analyzed as K-734. (4 11 88)

LRB-P-K-736 - Cryogenic tanks and systems can cause or be jeopardized by moisture or precipitation during launch abort activities, including mission

postponement (scrub). -- This hazard is analyzed as K-735. (4 11 88)

LRB-P-K-737 - Cryogenic tanks and systems can cause or be jeopardized by moisture or precipitation during nominal flight from liftoff to LRB burnout. -- This hazard is analyzed as K-735. Also see E-737. (4 11 88)

LRB-P-K-738 - Cryogenic tanks and systems can cause or be jeopardized by moisture or precipitation during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is analyzed as K-735 and E-737. (4 11 88)

LRB-P-K-739 - Cryogenic tanks and systems can cause or be jeopardized by moisture or precipitation during separation of the LRB from the STS vehicle. -- This hazard is analyzed as E-739. (4 11 88)

LRB-P-K-740 - Cryogenic tanks and systems can cause or be jeopardized by moisture or precipitation during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (4 11 88)

LRB-P-K-741 - Cryogenic tanks and systems can cause or be jeopardized by moisture or precipitation during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 11 88)

LRB-P-K-742 - Cryogenic tanks and systems can cause or be jeopardized by moisture or precipitation during floatation (of recoverable boosters) until recovery. -- This hazard is analyzed as K-694. (4 11 88)

LRB-P-K-743 - Cryogenic tanks and systems can cause or be jeopardized by moisture or precipitation during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 11 88)

LRB-P-K-744 - Cryogenic tanks and systems can cause or be jeopardized by moisture or precipitation during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 11 88)

LRB-P-K-745 - Cryogenic tanks and systems can cause or be jeopardized by electrical system malfunction during component or material purchase, including acquisition of GFP. -- At the current state of maturity, this hazard cannot be evaluated. (4 11 88)

LRB-P-K-746 - Cryogenic tanks and systems can cause or be jeopardized by electrical system malfunction during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 11 88)

LRB-P-K-747 - Cryogenic tanks and systems can cause or be jeopardized by electrical system malfunction during inspection and test of the LRB and subsystems. -- This is essentially the same hazard as that analyzed as E-747. (4 11 88)

LRB-P-K-748 - Cryogenic tanks and systems can cause or be jeopardized by electrical system malfunction during proof test of pressure vessels and structure. -- This is the hazard analyzed as G-748. (4 11 88)

LRB-P-K-749 - Cryogenic tanks and systems can cause or be jeopardized by electrical system malfunction during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 11 88)

LRB-P-K-750 - Cryogenic tanks and systems can cause or be jeopardized by electrical system malfunction during test firing of engines and/or the completed booster. -- This hazard is analyzed as H-750. (4 11 88)

LRB-P-K-751 - Cryogenic tanks and systems can cause or be jeopardized by electrical system malfunction during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as E-679. (4 11 88)

LRB-P-K-752 - Cryogenic tanks and systems can cause or be jeopardized by electrical system malfunction during preparation for shipment of the booster and ship loose hardware. -- This hazard is analyzed as G-753. (4 11 88)

LRB-P-K-753 - Cryogenic tanks and systems can cause or be jeopardized by electrical system malfunction during transportation from manufacture to launch site or after recovery. -- This hazard is analyzed as G-753. (4 11 88)

LRB-P-K-754 - Cryogenic tanks and systems can cause or be jeopardized by electrical system malfunction during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (4 11 88)

LRB-P-K-755 - Cryogenic tanks and systems can cause or be jeopardized by electrical system malfunction during preflight checkout prior to stacking. -- This hazard is analyzed as E-747. (4 11 88)

LRB-P-K-756 - Cryogenic tanks and systems can cause or be jeopardized by electrical system malfunction during vehicle stacking, including ancillary test activities. -- This hazard is analyzed as E-747. (4 11 88)

LRB-P-K-757 - Cryogenic tanks and systems can cause or be jeopardized by electrical system malfunction during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 11 88)

LRB-P-K-758 - Cryogenic tanks and systems can cause or be jeopardized by

electrical system malfunction during propellant loading for test or flight. -- This hazard is analyzed as E-686. (4 11 88)

LRB-P-K-759 - Cryogenic tanks and systems can cause or be jeopardized by electrical system malfunction during countdown to liftoff or abort. -- This hazard is analyzed as E-686. (4 11 88)

LRB-P-K-760 - Cryogenic tanks and systems can cause or be jeopardized by electrical system malfunction during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as E-686. (4 11 88)

LRB-P-K-761 - Cryogenic tanks and systems can cause or be jeopardized by electrical system malfunction during nominal flight from liftoff to LRB burnout. -- This hazard is analyzed as E-686. (4 11 88)

LRB-P-K-762 - Cryogenic tanks and systems can cause or be jeopardized by electrical system malfunction during intact abort, including RTLS, TAL, AOA and ATO. -- Due to the many contingencies involved in an intact abort situation, this hazard cannot be properly analyzed at this time. (4 11 88)

LRB-P-K-763 - Cryogenic tanks and systems can cause or be jeopardized by electrical system malfunction during separation of the LRB from the STS vehicle. -- This hazard is analyzed as E-739. (4 11 88)

LRB-P-K-764 - Cryogenic tanks and systems can cause or be jeopardized by electrical system malfunction during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (4 11 88)

LRB-P-K-765 - Cryogenic tanks and systems can cause or be jeopardized by electrical system malfunction during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 11 88)

LRB-P-K-766 - Cryogenic tanks and systems can cause or be jeopardized by electrical system malfunction during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 11 88)

LRB-P-K-767 - Cryogenic tanks and systems can cause or be jeopardized by electrical system malfunction during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 11 88)

LRB-P-K-768 - Cryogenic tanks and systems can cause or be jeopardized by electrical system malfunction during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 11 88)

LRB-P-K-769 - Cryogenic tanks and systems can cause or be jeopardized by differential pressure during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (4 11 88)

LRB-P-K-770 - Cryogenic tanks and systems can cause or be jeopardized by differential pressure during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 11 88)

LRB-P-K-771 - Cryogenic tanks and systems can cause or be jeopardized by differential pressure during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 12 88)

LRB-P-K-772 - Cryogenic tanks and systems can cause or be jeopardized by differential pressure during proof test of pressure vessels and structure. -- This hazard is analyzed as G-532. (4 12 88)

LRB-P-K-773 - Cryogenic tanks and systems can cause or be jeopardized by differential pressure during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 12 88)

LRB-P-K-774 - Cryogenic tanks and systems can cause or be jeopardized by differential pressure during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 12 88)

LRB-P-K-775 - Cryogenic tanks and systems can cause or be jeopardized by differential pressure during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 12 88)

LRB-P-K-777 - Cryogenic tanks and systems can cause or be jeopardized by differential pressure during transportation from manufacture to launch site or after recovery. -- This hazard is analyzed as K-776. (4 12 88)

LRB-P-K-778 - Cryogenic tanks and systems can cause or be jeopardized by differential pressure during storage, including storage of major components. -- The hazard of concern is damage to cryogenic tanks due to negative pressure. In view of the thickness of the tanks, this does not appear to be a credible concern. (4 12 88)

LRB-P-K-779 - Cryogenic tanks and systems can cause or be jeopardized by differential pressure during preflight checkout prior to stacking. -- This hazard is evaluated as K-776. (4 12 88)

LRB-P-K-780 - Cryogenic tanks and systems can cause or be jeopardized by differential pressure during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 12 88)

LRB-P-K-781 - Cryogenic tanks and systems can cause or be jeopardized by differential pressure during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 12 88)

LRB-P-K-783 - Cryogenic tanks and systems can cause or be jeopardized by differential pressure during countdown to liftoff or abort. -- This hazard is analyzed as K-782. (4 12 88)

LRB-P-K-784 - Cryogenic tanks and systems can cause or be jeopardized by differential pressure during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as K-782. (4 12 88)

LRB-P-K-785 - Cryogenic tanks and systems can cause or be jeopardized by differential pressure during nominal flight from liftoff to LRB burnout. -- Increased differential pressure or false low pressure readings in the LOX tank could cause venting from the tank. This hazard is analyzed as I-545. (4 12 88)

LRB-P-K-786 - Cryogenic tanks and systems can cause or be jeopardized by differential pressure during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is the same as oxygen venting in flight, analyzed as I-545. (4 12 88)

LRB-P-K-787 - Cryogenic tanks and systems can cause or be jeopardized by differential pressure during separation of the LRB from the STS vehicle. -- The thrust produced by vented oxygen is not likely to be a significant perturbation to the thrust of the booster separation motors. (4 12 88)

LRB-P-K-789 - Cryogenic tanks and systems can cause or be jeopardized by differential pressure during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 12 88)

LRB-P-K-790 - Cryogenic tanks and systems can cause or be jeopardized by differential pressure during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 12 88)

LRB-P-K-791 - Cryogenic tanks and systems can cause or be jeopardized by differential pressure during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 12 88)

LRB-P-K-792 - Cryogenic tanks and systems can cause or be jeopardized by differential pressure during refurbishment of reusable components. -- This hazard is not credible. (4 12 88)

LRB-P-K-793 - Cryogenic tanks and systems can cause or be jeopardized by vibration, acoustic loads or shock during component or material purchase, including

acquisition of GFP. -- This hazard is not credible. (4 12 88)

LRB-P-K-794 - Cryogenic tanks and systems can cause or be jeopardized by vibration, acoustic loads or shock during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 12 88)

LRB-P-K-795 - Cryogenic tanks and systems can cause or be jeopardized by vibration, acoustic loads or shock during inspection and test of the LRB and subsystems. -- This hazard is not credible. (4 12 88)

LRB-P-K-796 - Cryogenic tanks and systems can cause or be jeopardized by vibration, acoustic loads or shock during proof test of pressure vessels and structure. -- This hazard is not credible. (4 12 88)

LRB-P-K-797 - Cryogenic tanks and systems can cause or be jeopardized by vibration, acoustic loads or shock during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (4 12 88)

LRB-P-K-798 - Cryogenic tanks and systems can cause or be jeopardized by vibration, acoustic loads or shock during test firing of engines and/or the completed booster. -- Acoustic loads will have to be determined by engineering analysis and test. It is assumed that analysis, verified by GVTA testing, will identify any hazardous modes of oscillation and that these will be damped sufficiently to prevent damage. (4 12 88)

LRB-P-K-799 - Cryogenic tanks and systems can cause or be jeopardized by vibration, acoustic loads or shock during flight readiness firing (FRF) of the STS vehicle. -- The same comments apply as those for K-798. (4 12 88)

LRB-P-K-800 - Cryogenic tanks and systems can cause or be jeopardized by vibration, acoustic loads or shock during preparation for shipment of the booster and ship loose hardware. -- This hazard is not credible. (4 12 88)

LRB-P-K-801 - Cryogenic tanks and systems can cause or be jeopardized by vibration, acoustic loads or shock during transportation from manufacture to launch site or after recovery. -- Although transportation will involve movement by modes which may impart vibration or shock loads to the booster vehicle, it is assumed that the maximum loads will be defined and that the mode(s) of transportation used will protect the booster so that these loads are not reached in transit. (4 12 88)

LRB-P-K-802 - Cryogenic tanks and systems can cause or be jeopardized by vibration, acoustic loads or shock during storage, including storage of major components. -- This hazard is not credible. (4 12 88)

LRB-P-K-803 - Cryogenic tanks and systems can cause or be jeopardized by

vibration, acoustic loads or shock during preflight checkout prior to stacking. -- This hazard is not credible. (4 12 88)

LRB-P-K-804 - Cryogenic tanks and systems can cause or be jeopardized by vibration, acoustic loads or shock during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (4 12 88)

LRB-P-K-805 - Cryogenic tanks and systems can cause or be jeopardized by vibration, acoustic loads or shock during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 12 88)

LRB-P-K-807 - Cryogenic tanks and systems can cause or be jeopardized by vibration, acoustic loads or shock during countdown to liftoff or abort. -- This hazard is analyzed as K-806. (4 12 88)

LRB-P-K-808 - Cryogenic tanks and systems can cause or be jeopardized by vibration, acoustic loads or shock during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 12 88)

LRB-P-K-809 - Cryogenic tanks and systems can cause or be jeopardized by vibration, acoustic loads or shock during nominal flight from liftoff to LRB burnout. -- Since this is the design consideration, it is assumed that all loads will be properly analyzed and that the vehicle will be designed to withstand them. (4 12 88)

LRB-P-K-810 - Cryogenic tanks and systems can cause or be jeopardized by vibration, acoustic loads or shock during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 12 88)

LRB-P-K-811 - Cryogenic tanks and systems can cause or be jeopardized by vibration, acoustic loads or shock during separation of the LRB from the STS vehicle. -- This is also a design condition and therefore hazards from this source do not appear to be credible. (4 12 88)

LRB-P-K-812 - Cryogenic tanks and systems can cause or be jeopardized by vibration, acoustic loads or shock during descent from separation to ocean impact. -- This hazard is not credible. (4 12 88)

LRB-P-K-813 - Cryogenic tanks and systems can cause or be jeopardized by vibration, acoustic loads or shock during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 12 88)

LRB-P-K-814 - Cryogenic tanks and systems can cause or be jeopardized by vibration, acoustic loads or shock during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 12 88)

LRB-P-K-815 - Cryogenic tanks and systems can cause or be jeopardized by vibration, acoustic loads or shock during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (4 12 88)

LRB-P-K-816 - Cryogenic tanks and systems can cause or be jeopardized by vibration, acoustic loads or shock during refurbishment of reusable components. -- This hazard is not credible. (4 12 88)

LRB-P-K-841 - Cryogenic tanks and systems can cause or be jeopardized by leaks during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (4 12 88)

LRB-P-K-842 - Cryogenic tanks and systems can cause or be jeopardized by leaks during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 12 88)

LRB-P-K-843 - Cryogenic tanks and systems can cause or be jeopardized by leaks during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 12 88)

LRB-P-K-844 - Cryogenic tanks and systems can cause or be jeopardized by leaks during proof test of pressure vessels and structure. -- Although leakage during proof test could invalidate the test and damage equipment, the tank itself is considered to be thick enough that any flaw which might cause a leak would be larger than the critical size and would therefore cause the tank to burst. This hazard is analyzed as G-532. Other leaks would vary in severity depending upon the configuration of the testing facility, which is not sufficiently mature at this time for an analysis to be conducted for possibly hazardous conditions or failures. (4 12 88)

LRB-P-K-845 - Cryogenic tanks and systems can cause or be jeopardized by leaks during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 12 88)

LRB-P-K-846 - Cryogenic tanks and systems can cause or be jeopardized by leaks during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 12 88)

LRB-P-K-848 - Cryogenic tanks and systems can cause or be jeopardized by leaks during preparation for shipment of the booster and ship loose hardware. -- SFP leaks are analyzed as K-847. (4 13 88)

LRB-P-K-849 - Cryogenic tanks and systems can cause or be jeopardized by leaks during transportation from manufacture to launch site or after recovery. -- SFP leaks are analyzed as K-847. See also K-776. (4 13 88)

LRB-P-K-850 - Cryogenic tanks and systems can cause or be jeopardized by leaks

during storage, including storage of major components. -- SFP leaks are analyzed as K-847. (4 13 88)

LRB-P-K-851 - Cryogenic tanks and systems can cause or be jeopardized by leaks during preflight checkout prior to stacking. -- SFP leaks are analyzed as K-847. (4 13 88)

LRB-P-K-852 - Cryogenic tanks and systems can cause or be jeopardized by leaks during vehicle stacking, including ancillary test activities. -- SFP leaks are analyzed as K-847. (4 13 88)

LRB-P-K-853 - Cryogenic tanks and systems can cause or be jeopardized by leaks during rollout from the VAB and preloading preparation. -- SFP leaks are analyzed as K-847. (4 13 88)

LRB-P-K-855 - Cryogenic tanks and systems can cause or be jeopardized by leaks during countdown to liftoff or abort. -- This hazard is analyzed as K-847 and K-854. (4 13 88)

LRB-P-K-856 - Cryogenic tanks and systems can cause or be jeopardized by leaks during launch abort activities, including mission postponement (scrub). -- SFP leaks are analyzed as K-847. Bursting of bellows due to leaks is analyzed as K-854. (4 13 88)

LRB-P-K-858 - Cryogenic tanks and systems can cause or be jeopardized by leaks during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-859 - Cryogenic tanks and systems can cause or be jeopardized by leaks during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-860 - Cryogenic tanks and systems can cause or be jeopardized by leaks during descent from separation to ocean impact. -- This hazard is analyzed as K-788. (4 13 88)

LRB-P-K-861 - Cryogenic tanks and systems can cause or be jeopardized by leaks during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-862 - Cryogenic tanks and systems can cause or be jeopardized by leaks during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-863 - Cryogenic tanks and systems can cause or be jeopardized by leaks during recovery activities, including towing, and retrieval of recoverables. -- At the

current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-864 - Cryogenic tanks and systems can cause or be jeopardized by leaks during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-865 - Cryogenic tanks and systems can cause or be jeopardized by propellant characteristics and products during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (4 13 88)

LRB-P-K-866 - Cryogenic tanks and systems can cause or be jeopardized by propellant characteristics and products during manufacture and fabrication of subsystems and components. -- This hazard is not credible. (4 13 88)

LRB-P-K-867 - Cryogenic tanks and systems can cause or be jeopardized by propellant characteristics and products during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-868 - Cryogenic tanks and systems can cause or be jeopardized by propellant characteristics and products during proof test of pressure vessels and structure. -- This hazard is not credible. (4 13 88)

LRB-P-K-869 - Cryogenic tanks and systems can cause or be jeopardized by propellant characteristics and products during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (4 13 88)

LRB-P-K-870 - Cryogenic tanks and systems can cause or be jeopardized by propellant characteristics and products during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-871 - Cryogenic tanks and systems can cause or be jeopardized by propellant characteristics and products during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-872 - Cryogenic tanks and systems can cause or be jeopardized by propellant characteristics and products during preparation for shipment of the booster and ship loose hardware. -- This hazard is not credible. (4 13 88)

LRB-P-K-873 - Cryogenic tanks and systems can cause or be jeopardized by propellant characteristics and products during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (4 13 88)

LRB-P-K-874 - Cryogenic tanks and systems can cause or be jeopardized by propellant characteristics and products during storage, including storage of major

components. -- This hazard is not credible. (4 13 88)

LRB-P-K-875 - Cryogenic tanks and systems can cause or be jeopardized by propellant characteristics and products during preflight checkout prior to stacking. -- This hazard is not credible. (4 13 88)

LRB-P-K-876 - Cryogenic tanks and systems can cause or be jeopardized by propellant characteristics and products during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (4 13 88)

LRB-P-K-877 - Cryogenic tanks and systems can cause or be jeopardized by propellant characteristics and products during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 13 88)

LRB-P-K-878 - Cryogenic tanks and systems can cause or be jeopardized by propellant characteristics and products during propellant loading for test or flight. -- Since this is the design condition, it is assumed that propellant tanks and systems will be designed for the characteristics of the media contained. (4 13 88)

LRB-P-K-879 - Cryogenic tanks and systems can cause or be jeopardized by propellant characteristics and products during countdown to liftoff or abort. -- See comments for K-878. (4 13 88)

LRB-P-K-880 - Cryogenic tanks and systems can cause or be jeopardized by propellant characteristics and products during launch abort activities, including mission postponement (scrub). -- See comments for K-878. (4 13 88)

LRB-P-K-881 - Cryogenic tanks and systems can cause or be jeopardized by propellant characteristics and products during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-882 - Cryogenic tanks and systems can cause or be jeopardized by propellant characteristics and products during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-883 - Cryogenic tanks and systems can cause or be jeopardized by propellant characteristics and products during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-884 - Cryogenic tanks and systems can cause or be jeopardized by propellant characteristics and products during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-885 - Cryogenic tanks and systems can cause or be jeopardized by propellant characteristics and products during splashdown events occuring at impact

LRB-P-U-1055 - The environment or the public can cause or be jeopardized by emergencies during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (5 4 88)

LRB-P-U-1056 - The environment or the public can cause or be jeopardized by emergencies during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

THESE HAZARDS WERE CONSIDERED BY THE ANALYST BUT WERE NOT FURTHER ANALYZED FOR THE REASONS GIVEN

LRB-P-V-578 - Computer systems or software can cause or be jeopardized by unsafe or unhygienic working conditions during manufacture and fabrication of subsystems and components. -- Manufacture of computer components involves potential hazards for which adequate precautionary measures are taken. Therefore, this hazard, while credible, is not a matter for concern. (5 9 88)

LRB-P-V-579 - Computer systems or software can cause or be jeopardized by unsafe or unhygienic working conditions during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (5 9 88)

LRB-P-V-580 - Computer systems or software can cause or be jeopardized by unsafe or unhygienic working conditions during proof test of pressure vessels and structure. -- This hazard is analyzed as G-748. (5 9 88)

LRB-P-V-581 - Computer systems or software can cause or be jeopardized by unsafe or unhygienic working conditions during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (5 9 88)

LRB-P-V-582 - Computer systems or software can cause or be jeopardized by unsafe or unhygienic working conditions during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (5 9 88)

LRB-P-V-583 - Computer systems or software can cause or be jeopardized by unsafe or unhygienic working conditions during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as E-967. (5 9 88)

LRB-P-V-584 - Computer systems or software can cause or be jeopardized by unsafe or unhygienic working conditions during preparation for shipment of the booster and ship loose hardware. -- This hazard is analyzed as G-753. (5 9 88)

LRB-P-V-585 - Computer systems or software can cause or be jeopardized by unsafe or unhygienic working conditions during transportation from manufacture to launch site or after recovery. -- This hazard is analyzed as g-753. (5 9 88)

LRB-P-V-586 - Computer systems or software can cause or be jeopardized by unsafe or unhygienic working conditions during storage, including storage of major components. -- This hazard is not credible. (5 9 88)

LRB-P-V-587 - Computer systems or software can cause or be jeopardized by unsafe or unhygienic working conditions during preflight checkout prior to stacking. --

This hazard is analyzed as E-963. (5 9 88)

LRB-P-V-588 - Computer systems or software can cause or be jeopardized by unsafe or unhygienic working conditions during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (5 9 88)

LRB-P-V-589 - Computer systems or software can cause or be jeopardized by unsafe or unhygienic working conditions during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (5 9 88)

LRB-P-V-590 - Computer systems or software can cause or be jeopardized by unsafe or unhygienic working conditions during propellant loading for test or flight. -- This hazard is analyzed as E-967. (5 9 88)

LRB-P-V-591 - Computer systems or software can cause or be jeopardized by unsafe or unhygienic working conditions during countdown to liftoff or abort. -- This hazard is analyzed as E-967. (5 9 88)

LRB-P-V-592 - Computer systems or software can cause or be jeopardized by unsafe or unhygienic working conditions during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as E-967. (5 9 88)

LRB-P-V-598 - Computer systems or software can cause or be jeopardized by unsafe or unhygienic working conditions during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (5 9 88)

LRB-P-V-599 - Computer systems or software can cause or be jeopardized by unsafe or unhygienic working conditions during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (5 9 88)

LRB-P-V-600 - Computer systems or software can cause or be jeopardized by unsafe or unhygienic working conditions during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (5 9 88)

LRB-P-V-699 - Computer systems or software can cause or be jeopardized by radiation or sunlight during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (5 9 88)

LRB-P-V-701 - Computer systems or software can cause or be jeopardized by radiation or sunlight during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (5 9 88)

LRB-P-V-702 - Computer systems or software can cause or be jeopardized by

radiation or sunlight during test firing of engines and/or the completed booster. -- This hazard is not credible. (5 9 88)

LRB-P-V-703 - Computer systems or software can cause or be jeopardized by radiation or sunlight during flight readiness firing (FRF) of the STS vehicle. -- This hazard is not credible. (5 9 88)

LRB-P-V-705 - Computer systems or software can cause or be jeopardized by radiation or sunlight during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (5 9 88)

LRB-P-V-708 - Computer systems or software can cause or be jeopardized by radiation or sunlight during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (5 9 88)

LRB-P-V-709 - Computer systems or software can cause or be jeopardized by radiation or sunlight during rollout from the VAB and preloading preparation. -- This hazard is not credible. (5 9 88)

LRB-P-V-710 - Computer systems or software can cause or be jeopardized by radiation or sunlight during propellant loading for test or flight. -- This hazard is not credible. (5 9 88)

LRB-P-V-711 - Computer systems or software can cause or be jeopardized by radiation or sunlight during countdown to liftoff or abort. -- This hazard is not credible. (5 9 88)

LRB-P-V-712 - Computer systems or software can cause or be jeopardized by radiation or sunlight during launch abort activities, including mission postponement (scrub). -- This hazard is not credible. (5 9 88)

LRB-P-V-713 - Computer systems or software can cause or be jeopardized by radiation or sunlight during nominal flight from liftoff to LRB burnout. -- This hazard is analyzed as A-977 for avionics and M-713 for engine controllers. Similar considerations apply to any other on-board computerized system. All such systems should be provided with nuclear event protection. (5 9 88)

LRB-P-V-714 - Computer systems or software can cause or be jeopardized by radiation or sunlight during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is analyzed as V-714. (5 9 88)

LRB-P-V-715 - Computer systems or software can cause or be jeopardized by radiation or sunlight during separation of the LRB from the STS vehicle. -- This hazard is not credible. (5 9 88)

LRB-P-V-716 - Computer systems or software can cause or be jeopardized by

radiation or sunlight during descent from separation to ocean impact. -- This hazard is not credible. (5 9 88)

LRB-P-V-717 - Computer systems or software can cause or be jeopardized by radiation or sunlight during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (5 9 88)

LRB-P-V-718 - Computer systems or software can cause or be jeopardized by radiation or sunlight during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (5 9 88)

LRB-P-V-719 - Computer systems or software can cause or be jeopardized by radiation or sunlight during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (5 9 88)

LRB-P-V-720 - Computer systems or software can cause or be jeopardized by radiation or sunlight during refurbishment of reusable components. -- This hazard is not credible. (5 9 88)

LRB-P-V-747 - Computer systems or software can cause or be jeopardized by electrical system malfunction during inspection and test of the LRB and subsystems. -- This hazard is analyzed as B-747, D-747, E-747 and E-963. (5 9 88)

LRB-P-V-748 - Computer systems or software can cause or be jeopardized by electrical system malfunction during proof test of pressure vessels and structure. -- This hazard is analyzed as V-746. (5 9 88)

LRB-P-V-749 - Computer systems or software can cause or be jeopardized by electrical system malfunction during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (5 9 88)

LRB-P-V-750 - Computer systems or software can cause or be jeopardized by electrical system malfunction during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (5 9 88)

LRB-P-V-751 - Computer systems or software can cause or be jeopardized by electrical system malfunction during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (5 9 88)

LRB-P-V-752 - Computer systems or software can cause or be jeopardized by electrical system malfunction during preparation for shipment of the booster and ship loose hardware. -- This hazard is analyzed as G-753. (5 9 88)

LRB-P-V-753 - Computer systems or software can cause or be jeopardized by electrical system malfunction during transportation from manufacture to launch site or after recovery. -- This hazard is analyzed as G-753. (5 9 88)

LRB-P-V-754 - Computer systems or software can cause or be jeopardized by electrical system malfunction during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (5 9 88)

LRB-P-V-755 - Computer systems or software can cause or be jeopardized by electrical system malfunction during preflight checkout prior to stacking. -- This hazard is analyzed as E-963 and E-967. (5 9 88)

LRB-P-V-756 - Computer systems or software can cause or be jeopardized by electrical system malfunction during vehicle stacking, including ancillary test activities. -- This hazard is analyzed as E-963 and E-967. (5 9 88)

LRB-P-V-757 - Computer systems or software can cause or be jeopardized by electrical system malfunction during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (5 9 88)

LRB-P-V-758 - Computer systems or software can cause or be jeopardized by electrical system malfunction during propellant loading for test or flight. -- This hazard is analyzed as E-967. (5 9 88)

LRB-P-V-759 - Computer systems or software can cause or be jeopardized by electrical system malfunction during countdown to liftoff or abort. -- This hazard is analyzed as E-963 and E-967. (5 9 88)

LRB-P-V-760 - Computer systems or software can cause or be jeopardized by electrical system malfunction during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as E-963 and E-967. (5 9 88)

LRB-P-V-761 - Computer systems or software can cause or be jeopardized by electrical system malfunction during nominal flight from liftoff to LRB burnout. -- This hazard is analyzed as E-977. (5 9 88)

LRB-P-V-762 - Computer systems or software can cause or be jeopardized by electrical system malfunction during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is analyzed as E-977. (5 9 88)

LRB-P-V-763 - Computer systems or software can cause or be jeopardized by electrical system malfunction during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (5 9 88)

LRB-P-V-764 - Computer systems or software can cause or be jeopardized by electrical system malfunction during descent from separation to ocean impact. -- This hazard is not credible. (5 9 88)

LRB-P-V-765 - Computer systems or software can cause or be jeopardized by electrical system malfunction during splashdown events occuring at impact

(disposable for expendables). -- This hazard is not credible. (5 9 88)

LRB-P-V-766 - Computer systems or software can cause or be jeopardized by electrical system malfunction during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (5 9 88)

LRB-P-V-767 - Computer systems or software can cause or be jeopardized by electrical system malfunction during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (5 9 88)

LRB-P-V-768 - Computer systems or software can cause or be jeopardized by electrical system malfunction during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (5 9 88)

LRB-P-V-798 - Computer systems or software can cause or be jeopardized by vibration, acoustic loads or shock during test firing of engines and/or the completed booster. -- It may be assumed that computerized systems will be designed to withstand the test and launch environment. (5 9 88)

LRB-P-V-799 - Computer systems or software can cause or be jeopardized by vibration, acoustic loads or shock during flight readiness firing (FRF) of the STS vehicle. -- It may be assumed that computerized systems will be designed to withstand the test and launch environment. (5 9 88)

LRB-P-V-801 - Computer systems or software can cause or be jeopardized by vibration, acoustic loads or shock during transportation from manufacture to launch site or after recovery. -- Transportation acoustic environments will be less than those experienced during test and launch. (5 9 88)

LRB-P-V-808 - Computer systems or software can cause or be jeopardized by vibration, acoustic loads or shock during launch abort activities, including mission postponement (scrub). -- It is assumed that computerized systems will be designed to withstand the acoustic environment encountered. (5 10 88)

LRB-P-V-809 - Computer systems or software can cause or be jeopardized by vibration, acoustic loads or shock during nominal flight from liftoff to LRB burnout. -- It is assumed that computerized systems will be designed to withstand the acoustic environment encountered. (5 10 88)

LRB-P-V-810 - Computer systems or software can cause or be jeopardized by vibration, acoustic loads or shock during intact abort, including RTLS, TAL, AOA and ATO. -- It is assumed that computerized systems will be designed to withstand the acoustic environment encountered. (5 10 88)

LRB-P-V-811 - Computer systems or software can cause or be jeopardized by vibration, acoustic loads or shock during separation of the LRB from the STS vehicle.

-- It is assumed that computerized systems will be designed to withstand the acoustic environment encountered. (5 10 88)

LRB-P-V-812 - Computer systems or software can cause or be jeopardized by vibration, acoustic loads or shock during descent from separation to ocean impact. -- This hazard is not credible. (5 10 88)

LRB-P-V-813 - Computer systems or software can cause or be jeopardized by vibration, acoustic loads or shock during splashdown events occuring at impact (disposable for expendables). -- (5 10 88)

LRB-P-V-815 - Computer systems or software can cause or be jeopardized by vibration, acoustic loads or shock during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (5 10 88)

LRB-P-V-894 - Computer systems or software can cause or be jeopardized by lightning or electromagnetic discharge during test firing of engines and/or the completed booster. -- It is assumed that test firing will not take place when there is danger of lightning. (5 10 88)

LRB-P-V-895 - Computer systems or software can cause or be jeopardized by lightning or electromagnetic discharge during flight readiness firing (FRF) of the STS vehicle. -- It is assumed that test firing will not take place when there is danger of lightning. (5 10 88)

LRB-P-V-897 - Computer systems or software can cause or be jeopardized by lightning or electromagnetic discharge during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (5 10 88)

LRB-P-V-898 - Computer systems or software can cause or be jeopardized by lightning or electromagnetic discharge during storage, including storage of major components. -- This hazard is not credible. (5 10 88)

LRB-P-V-901 - Computer systems or software can cause or be jeopardized by lightning or electromagnetic discharge during rollout from the VAB and preloading preparation. -- It is assumed that computerized systems will be shielded in such a way that lightning strike on the vehicle after it is stacked will not jeopardize them. (5 10 88)

LRB-P-V-902 - Computer systems or software can cause or be jeopardized by lightning or electromagnetic discharge during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (5 10 88)

LRB-P-V-903 - Computer systems or software can cause or be jeopardized by lightning or electromagnetic discharge during countdown to liftoff or abort. -- At the

current state of maturity, this hazard cannot be evaluated. (5 10 88)

LRB-P-V-904 - Computer systems or software can cause or be jeopardized by lightning or electromagnetic discharge during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (5 10 88)

LRB-P-V-905 - Computer systems or software can cause or be jeopardized by lightning or electromagnetic discharge during nominal flight from liftoff to LRB burnout. -- Current specifications require that the LRB be capable of surviving a lightning strike. It is assumed that on-board computerized systems will be adequately protected. (5 10 88)

LRB-P-V-906 - Computer systems or software can cause or be jeopardized by lightning or electromagnetic discharge during intact abort, including RTLS, TAL, AOA and ATO. -- See comment for V-905. (5 10 88)

LRB-P-V-907 - Computer systems or software can cause or be jeopardized by lightning or electromagnetic discharge during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (5 10 88)

LRB-P-V-908 - Computer systems or software can cause or be jeopardized by lightning or electromagnetic discharge during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (5 10 88)

LRB-P-V-909 - Computer systems or software can cause or be jeopardized by lightning or electromagnetic discharge during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (5 10 88)

LRB-P-V-910 - Computer systems or software can cause or be jeopardized by lightning or electromagnetic discharge during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (5 10 88)

LRB-P-V-911 - Computer systems or software can cause or be jeopardized by lightning or electromagnetic discharge during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (5 10 88)

LRB-P-V-913 - Computer systems or software can cause or be jeopardized by faulty documentation during component or material purchase, including acquisition of GFP. -- At the current state of maturity, this hazard cannot be evaluated. (5 10 88)

LRB-P-V-914 - Computer systems or software can cause or be jeopardized by faulty documentation during manufacture and fabrication of subsystems and components.

-- At the current state of maturity, this hazard cannot be evaluated. (5 10 88)

LRB-P-V-915 - Computer systems or software can cause or be jeopardized by faulty documentation during inspection and test of the LRB and subsystems. -- To the extent that it applies, this hazard is analyzed as E-963. (5 10 88)

LRB-P-V-916 - Computer systems or software can cause or be jeopardized by faulty documentation during proof test of pressure vessels and structure. -- This hazard is not credible. (5 10 88)

LRB-P-V-917 - Computer systems or software can cause or be jeopardized by faulty documentation during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (5 10 88)

LRB-P-V-918 - Computer systems or software can cause or be jeopardized by faulty documentation during test firing of engines and/or the completed booster. -- To the extent that it applies, this hazard is analyzed as E-967. (5 10 88)

LRB-P-V-919 - Computer systems or software can cause or be jeopardized by faulty documentation during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as E-967. (5 10 88)

LRB-P-V-920 - Computer systems or software can cause or be jeopardized by faulty documentation during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (5 10 88)

LRB-P-V-921 - Computer systems or software can cause or be jeopardized by faulty documentation during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (5 10 88)

LRB-P-V-922 - Computer systems or software can cause or be jeopardized by faulty documentation during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (5 10 88)

LRB-P-V-923 - Computer systems or software can cause or be jeopardized by faulty documentation during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (5 10 88)

LRB-P-V-924 - Computer systems or software can cause or be jeopardized by faulty documentation during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (5 10 88)

LRB-P-V-925 - Computer systems or software can cause or be jeopardized by faulty documentation during rollout from the VAB and preloading preparation. -- At the

current state of maturity, this hazard cannot be evaluated. (5 10 88)

LRB-P-V-926 - Computer systems or software can cause or be jeopardized by faulty documentation during propellant loading for test or flight. -- This hazard is analyzed as E-967. (5 10 88)

LRB-P-V-927 - Computer systems or software can cause or be jeopardized by faulty documentation during countdown to liftoff or abort. -- This hazard is analyzed as E-967. (5 10 88)

LRB-P-V-928 - Computer systems or software can cause or be jeopardized by faulty documentation during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as E-967. (5 10 88)

LRB-P-V-929 - Computer systems or software can cause or be jeopardized by faulty documentation during nominal flight from liftoff to LRB burnout. -- This hazard is analyzed as E-977. (5 10 88)

LRB-P-V-930 - Computer systems or software can cause or be jeopardized by faulty documentation during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is analyzed as E-977. (5 10 88)

LRB-P-V-931 - Computer systems or software can cause or be jeopardized by faulty documentation during separation of the LRB from the STS vehicle. -- This hazard is analyzed as E-977. (5 10 88)

LRB-P-V-935 - Computer systems or software can cause or be jeopardized by faulty documentation during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (5 10 88)

LRB-P-V-936 - Computer systems or software can cause or be jeopardized by faulty documentation during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (5 10 88)

LRB-P-V-962 - Computer systems or software can cause or be jeopardized by computer system malfunction during manufacture and fabrication of subsystems and components. -- This hazard is analyzed as E-963. (5 10 88)

LRB-P-V-963 - Computer systems or software can cause or be jeopardized by computer system malfunction during inspection and test of the LRB and subsystems. -- This hazard is analyzed as A-963 and E-963. (5 10 88)

LRB-P-V-964 - Computer systems or software can cause or be jeopardized by computer system malfunction during proof test of pressure vessels and structure. -- This hazard is analyzed as G-748. (5 10 88)

LRB-P-V-965 - Computer systems or software can cause or be jeopardized by computer system malfunction during acceptance test and checkout prior to delivery to the Government. -- This hazard is analyzed as E-963. (5 10 88)

LRB-P-V-966 - Computer systems or software can cause or be jeopardized by computer system malfunction during test firing of engines and/or the completed booster. -- This hazard is analyzed as E-967. (5 10 88)

LRB-P-V-967 - Computer systems or software can cause or be jeopardized by computer system malfunction during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as E-967. (5 10 88)

LRB-P-V-969 - Computer systems or software can cause or be jeopardized by computer system malfunction during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (5 10 88)

LRB-P-V-970 - Computer systems or software can cause or be jeopardized by computer system malfunction during storage, including storage of major components. -- This hazard is not credible. (5 10 88)

LRB-P-V-971 - Computer systems or software can cause or be jeopardized by computer system malfunction during preflight checkout prior to stacking. -- This hazard is analyzed as A-971. (5 10 88)

LRB-P-V-972 - Computer systems or software can cause or be jeopardized by computer system malfunction during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (5 10 88)

LRB-P-V-973 - Computer systems or software can cause or be jeopardized by computer system malfunction during rollout from the VAB and preloading preparation. -- This hazard is not credible. (5 10 88)

LRB-P-V-974 - Computer systems or software can cause or be jeopardized by computer system malfunction during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (5 10 88)

LRB-P-V-975 - Computer systems or software can cause or be jeopardized by computer system malfunction during countdown to liftoff or abort. -- This hazard is analyzed as A-975. (5 10 88)

LRB-P-V-976 - Computer systems or software can cause or be jeopardized by computer system malfunction during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as D-760. (5 10 88)

LRB-P-V-977 - Computer systems or software can cause or be jeopardized by computer system malfunction during nominal flight from liftoff to LRB burnout. -- This

hazard is analyzed as E-977. (5 10 88)

LRB-P-V-978 - Computer systems or software can cause or be jeopardized by computer system malfunction during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is evaluated as D-762. (5 10 88)

LRB-P-V-979 - Computer systems or software can cause or be jeopardized by computer system malfunction during separation of the LRB from the STS vehicle. -- This hazard is analyzed as A-979. (5 10 88)

LRB-P-V-980 - Computer systems or software can cause or be jeopardized by computer system malfunction during descent from separation to ocean impact. -- This hazard is not credible. (5 10 88)

LRB-P-V-981 - Computer systems or software can cause or be jeopardized by computer system malfunction during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (5 10 88)

LRB-P-V-982 - Computer systems or software can cause or be jeopardized by computer system malfunction during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (5 10 88)

LRB-P-V-983 - Computer systems or software can cause or be jeopardized by computer system malfunction during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (5 10 88)

LRB-P-V-984 - Computer systems or software can cause or be jeopardized by computer system malfunction during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (5 10 88)

LRB-P-V-1034 - Computer systems or software can cause or be jeopardized by emergencies during manufacture and fabrication of subsystems and components. -- This hazard is analyzed as E-747. (5 10 88)

LRB-P-V-1035 - Computer systems or software can cause or be jeopardized by emergencies during inspection and test of the LRB and subsystems. -- This hazard is analyzed as E-747 and D-963. (5 10 88)

LRB-P-V-1036 - Computer systems or software can cause or be jeopardized by emergencies during proof test of pressure vessels and structure. -- This hazard is analyzed as G-748. (5 10 88)

LRB-P-V-1037 - Computer systems or software can cause or be jeopardized by emergencies during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (5 10 88)

LRB-P-V-1038 - Computer systems or software can cause or be jeopardized by emergencies during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (5 10 88)

LRB-P-V-1039 - Computer systems or software can cause or be jeopardized by emergencies during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (5 10 88)

LRB-P-V-1040 - Computer systems or software can cause or be jeopardized by emergencies during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (5 10 88)

LRB-P-V-1041 - Computer systems or software can cause or be jeopardized by emergencies during transportation from manufacture to launch site or after recovery. -- This hazard is analyzed as G-753. (5 10 88)

LRB-P-V-1042 - Computer systems or software can cause or be jeopardized by emergencies during storage, including storage of major components. -- This hazard is not credible. (5 10 88)

LRB-P-V-1043 - Computer systems or software can cause or be jeopardized by emergencies during preflight checkout prior to stacking. -- This hazard is analyzed as E-747. (5 10 88)

LRB-P-V-1044 - Computer systems or software can cause or be jeopardized by emergencies during vehicle stacking, including ancillary test activities. -- This hazard is analyzed as E-747. (5 10 88)

LRB-P-V-1045 - Computer systems or software can cause or be jeopardized by emergencies during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (5 10 88)

LRB-P-V-1046 - Computer systems or software can cause or be jeopardized by emergencies during propellant loading for test or flight. -- This hazard is analyzed as E-967. (5 10 88)

LRB-P-V-1047 - Computer systems or software can cause or be jeopardized by emergencies during countdown to liftoff or abort. -- This hazard is analyzed as E-967. (5 10 88)

LRB-P-V-1048 - Computer systems or software can cause or be jeopardized by emergencies during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as B-760. (5 10 88)

LRB-P-V-1049 - Computer systems or software can cause or be jeopardized by

emergencies during nominal flight from liftoff to LRB burnout. -- This hazard is analyzed as E-977. (5 10 88)

LRB-P-V-1050 - Computer systems or software can cause or be jeopardized by emergencies during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is analyzed as E-977. (5 10 88)

LRB-P-V-1051 - Computer systems or software can cause or be jeopardized by emergencies during separation of the LRB from the STS vehicle. -- This hazard is analyzed as E-977. (5 10 88)

LRB-P-V-1052 - Computer systems or software can cause or be jeopardized by emergencies during descent from separation to ocean impact. -- This hazard is not credible. (5 10 88)

LRB-P-V-1053 - Computer systems or software can cause or be jeopardized by emergencies during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (5 10 88)

LRB-P-V-1054 - Computer systems or software can cause or be jeopardized by emergencies during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (5 10 88)

LRB-P-V-1055 - Computer systems or software can cause or be jeopardized by emergencies during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (5 10 88)

LRB-P-V-1056 - Computer systems or software can cause or be jeopardized by emergencies during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (5 10 88)

THESE HAZARDS WERE CONSIDERED BY THE ANALYST BUT WERE NOT FURTHER ANALYZED FOR THE REASONS GIVEN

LRB-P-W-746 - The pressurization subsystem can cause or be jeopardized by electrical system malfunction during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (6 22 88)

LRB-P-W-748 - The pressurization subsystem can cause or be jeopardized by electrical system malfunction during proof test of pressure vessels and structure. -- It is anticipated that proof tests will be made on tanks with outlets to electrical valves blocked off. However, this hazard is evaluated as G-748. (6 22 88)

LRB-P-W-749 - The pressurization subsystem can cause or be jeopardized by electrical system malfunction during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (6 22 88)

LRB-P-W-750 - The pressurization subsystem can cause or be jeopardized by electrical system malfunction during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (6 22 88)

LRB-P-W-751 - The pressurization subsystem can cause or be jeopardized by electrical system malfunction during flight readiness firing (FRF) of the STS vehicle. -- This hazard is evaluated as W-747. (6 22 88)

LRB-P-W-753 - The pressurization subsystem can cause or be jeopardized by electrical system malfunction during transportation from manufacture to launch site or after recovery. -- This hazard is evaluated as W-752. (6 22 88)

LRB-P-W-754 - The pressurization subsystem can cause or be jeopardized by electrical system malfunction during storage, including storage of major components. -- This hazard is evaluated as W-752. (6 22 88)

LRB-P-W-755 - The pressurization subsystem can cause or be jeopardized by electrical system malfunction during preflight checkout prior to stacking. -- This hazard is evaluated as W-752. (6 22 88)

LRB-P-W-756 - The pressurization subsystem can cause or be jeopardized by electrical system malfunction during vehicle stacking, including ancillary test activities. -- This hazard is evaluated as W-752. (6 22 88)

LRB-P-W-757 - The pressurization subsystem can cause or be jeopardized by electrical system malfunction during rollout from the VAB and preloading preparation. -- This hazard is evaluated as W-752. (6 22 88)

LRB-P-W-758 - The pressurization subsystem can cause or be jeopardized by electrical system malfunction during propellant loading for test or flight. -- This hazard is evaluated as W-747. (6 22 88)

LRB-P-W-759 - The pressurization subsystem can cause or be jeopardized by electrical system malfunction during countdown to liftoff or abort. -- This hazard is evaluated as W-747. (6 22 88)

LRB-P-W-761 - The pressurization subsystem can cause or be jeopardized by electrical system malfunction during nominal flight from liftoff to LRB burnout. -- Any electrical malfunction during flight can be expected to have serious consequences. It is assumed that the vehicle will be provided with sufficient redundancy that hazards from this cause during flight will not be a credible concern. (6 22 88)

LRB-P-W-762 - The pressurization subsystem can cause or be jeopardized by electrical system malfunction during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (6 22 88)

LRB-P-W-764 - The pressurization subsystem can cause or be jeopardized by electrical system malfunction during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (6 22 88)

LRB-P-W-765 - The pressurization subsystem can cause or be jeopardized by electrical system malfunction during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (6 22 88)

LRB-P-W-766 - The pressurization subsystem can cause or be jeopardized by electrical system malfunction during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 22 88)

LRB-P-W-767 - The pressurization subsystem can cause or be jeopardized by electrical system malfunction during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (6 22 88)

LRB-P-W-768 - The pressurization subsystem can cause or be jeopardized by electrical system malfunction during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (6 22 88)

LRB-P-W-772 - The pressurization subsystem can cause or be jeopardized by differential pressure during proof test of pressure vessels and structure. -- The obvious concern here is failure during proof test. This is a hazard which cannot be avoided. (6 23 88)

LRB-P-W-774 - The pressurization subsystem can cause or be jeopardized by differential pressure during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-775 - The pressurization subsystem can cause or be jeopardized by differential pressure during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-777 - The pressurization subsystem can cause or be jeopardized by differential pressure during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-778 - The pressurization subsystem can cause or be jeopardized by differential pressure during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-782 - The pressurization subsystem can cause or be jeopardized by differential pressure during propellant loading for test or flight. -- Relief valves which will alleviate this problem are to be included in the design. (6 23 88)

LRB-P-W-783 - The pressurization subsystem can cause or be jeopardized by differential pressure during countdown to liftoff or abort. -- This hazard is analyzed as W-760. (6 23 88)

LRB-P-W-784 - The pressurization subsystem can cause or be jeopardized by differential pressure during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as W-760. (6 23 88)

LRB-P-W-785 - The pressurization subsystem can cause or be jeopardized by differential pressure during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-786 - The pressurization subsystem can cause or be jeopardized by differential pressure during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-787 - The pressurization subsystem can cause or be jeopardized by differential pressure during separation of the LRB from the STS vehicle. -- Propulsive venting might be an issue during separation, except that current specifications require that propulsive venting must be avoided. (6 23 88)

LRB-P-W-788 - The pressurization subsystem can cause or be jeopardized by differential pressure during descent from separation to ocean impact. -- This hazard is analyzed as W-760. (6 23 88)

LRB-P-W-789 - The pressurization subsystem can cause or be jeopardized by differential pressure during splashdown events occuring at impact (disposable for expendables). -- This hazard is analyzed as W-760. (6 23 88)

LRB-P-W-790 - The pressurization subsystem can cause or be jeopardized by differential pressure during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-791 - The pressurization subsystem can cause or be jeopardized by differential pressure during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-799 - The pressurization subsystem can cause or be jeopardized by vibration, acoustic loads or shock during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as W-798. (6 23 88)

LRB-P-W-801 - The pressurization subsystem can cause or be jeopardized by vibration, acoustic loads or shock during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (6 23 88)

LRB-P-W-808 - The pressurization subsystem can cause or be jeopardized by vibration, acoustic loads or shock during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as W-798. (6 23 88)

LRB-P-W-809 - The pressurization subsystem can cause or be jeopardized by vibration, acoustic loads or shock during nominal flight from liftoff to LRB burnout. -- This hazard is analyzed as W-798. (6 23 88)

LRB-P-W-810 - The pressurization subsystem can cause or be jeopardized by vibration, acoustic loads or shock during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is analyzed as W-798. (6 23 88)

LRB-P-W-811 - The pressurization subsystem can cause or be jeopardized by vibration, acoustic loads or shock during separation of the LRB from the STS vehicle. -- This hazard is analyzed as W-798. (6 23 88)

LRB-P-W-812 - The pressurization subsystem can cause or be jeopardized by vibration, acoustic loads or shock during descent from separation to ocean impact. -- This hazard is not credible. (6 23 88)

LRB-P-W-813 - The pressurization subsystem can cause or be jeopardized by vibration, acoustic loads or shock during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (6 23 88)

LRB-P-W-815 - The pressurization subsystem can cause or be jeopardized by

vibration, acoustic loads or shock during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (6 23 88)

LRB-P-W-843 - The pressurization subsystem can cause or be jeopardized by leaks during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-845 - The pressurization subsystem can cause or be jeopardized by leaks during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-847 - The pressurization subsystem can cause or be jeopardized by leaks during flight readiness firing (FRF) of the STS vehicle. -- This hazard is evaluated as W-846. (6 23 88)

LRB-P-W-849 - The pressurization subsystem can cause or be jeopardized by leaks during transportation from manufacture to launch site or after recovery. -- This hazard is analyzed as K-776. (6 23 88)

LRB-P-W-850 - The pressurization subsystem can cause or be jeopardized by leaks during storage, including storage of major components. -- This hazard is analyzed as K-776. (6 23 88)

LRB-P-W-851 - The pressurization subsystem can cause or be jeopardized by leaks during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-852 - The pressurization subsystem can cause or be jeopardized by leaks during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-853 - The pressurization subsystem can cause or be jeopardized by leaks during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-855 - The pressurization subsystem can cause or be jeopardized by leaks during countdown to liftoff or abort. -- This hazard is analyzed as W-854. (6 23 88)

LRB-P-W-856 - The pressurization subsystem can cause or be jeopardized by leaks during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as W-854. (6 23 88)

LRB-P-W-857 - The pressurization subsystem can cause or be jeopardized by leaks during nominal flight from liftoff to LRB burnout. -- This hazard is analyzed as W-846. (6 23 88)

LRB-P-W-858 - The pressurization subsystem can cause or be jeopardized by leaks during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is analyzed as W-846. (6 23 88)

LRB-P-W-859 - The pressurization subsystem can cause or be jeopardized by leaks during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-860 - The pressurization subsystem can cause or be jeopardized by leaks during descent from separation to ocean impact. -- This hazard is not credible. (6 23 88)

LRB-P-W-861 - The pressurization subsystem can cause or be jeopardized by leaks during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (6 23 88)

LRB-P-W-862 - The pressurization subsystem can cause or be jeopardized by leaks during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (6 23 88)

LRB-P-W-863 - The pressurization subsystem can cause or be jeopardized by leaks during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-864 - The pressurization subsystem can cause or be jeopardized by leaks during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-870 - The pressurization subsystem can cause or be jeopardized by propellant characteristics and products during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-871 - The pressurization subsystem can cause or be jeopardized by propellant characteristics and products during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-873 - The pressurization subsystem can cause or be jeopardized by propellant characteristics and products during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (6 23 88)

LRB-P-W-874 - The pressurization subsystem can cause or be jeopardized by propellant characteristics and products during storage, including storage of major components. -- This hazard is not credible. (6 23 88)

LRB-P-W-877 - The pressurization subsystem can cause or be jeopardized by

propellant characteristics and products during rollout from the VAB and preloading preparation. -- This hazard is not credible. (6 23 88)

LRB-P-W-879 - The pressurization subsystem can cause or be jeopardized by propellant characteristics and products during countdown to liftoff or abort. -- This hazard is analyzed as W-878. (6 23 88)

LRB-P-W-880 - The pressurization subsystem can cause or be jeopardized by propellant characteristics and products during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-882 - The pressurization subsystem can cause or be jeopardized by propellant characteristics and products during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is analyzed as W-881. (6 23 88)

LRB-P-W-883 - The pressurization subsystem can cause or be jeopardized by propellant characteristics and products during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-884 - The pressurization subsystem can cause or be jeopardized by propellant characteristics and products during descent from separation to ocean impact. -- This hazard is not credible. (6 23 88)

LRB-P-W-885 - The pressurization subsystem can cause or be jeopardized by propellant characteristics and products during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (6 23 88)

LRB-P-W-886 - The pressurization subsystem can cause or be jeopardized by propellant characteristics and products during floatation (of recoverable boosters) until recovery. -- This hazard is analyzed as K-735. (6 23 88)

LRB-P-W-887 - The pressurization subsystem can cause or be jeopardized by propellant characteristics and products during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-888 - The pressurization subsystem can cause or be jeopardized by propellant characteristics and products during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-894 - The pressurization subsystem can cause or be jeopardized by lightning or electromagnetic discharge during test firing of engines and/or the completed booster. -- It is assumed that test firing will not take place when there is danger of lightning. (6 23 88)

LRB-P-W-895 - The pressurization subsystem can cause or be jeopardized by lightning or electromagnetic discharge during flight readiness firing (FRF) of the STS vehicle. -- It is assumed that FRF will not take place when there is danger of lightning. (6 23 88)

LRB-P-W-897 - The pressurization subsystem can cause or be jeopardized by lightning or electromagnetic discharge during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (6 23 88)

LRB-P-W-898 - The pressurization subsystem can cause or be jeopardized by lightning or electromagnetic discharge during storage, including storage of major components. -- This hazard is not credible. (6 23 88)

LRB-P-W-901 - The pressurization subsystem can cause or be jeopardized by lightning or electromagnetic discharge during rollout from the VAB and preloading preparation. -- Although the LRB is vulnerable to lightning at this time, the only exposed portions of the pressurization system appear to be the pressurization lines. The hazard of lightning strike on these lines is analyzed as S-901. (6 23 88)

LRB-P-W-902 - The pressurization subsystem can cause or be jeopardized by lightning or electromagnetic discharge during propellant loading for test or flight. -- See comments for W-901. (6 23 88)

LRB-P-W-903 - The pressurization subsystem can cause or be jeopardized by lightning or electromagnetic discharge during countdown to liftoff or abort. -- See comments for W-901. (6 23 88)

LRB-P-W-904 - The pressurization subsystem can cause or be jeopardized by lightning or electromagnetic discharge during launch abort activities, including mission postponement (scrub). -- See comments for W-901. (6 23 88)

LRB-P-W-905 - The pressurization subsystem can cause or be jeopardized by lightning or electromagnetic discharge during nominal flight from liftoff to LRB burnout. -- See comments for W-901. (6 23 88)

LRB-P-W-906 - The pressurization subsystem can cause or be jeopardized by lightning or electromagnetic discharge during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (6 23 88)

LRB-P-W-907 - The pressurization subsystem can cause or be jeopardized by lightning or electromagnetic discharge during separation of the LRB from the STS vehicle. -- This hazard is not credible. (6 23 88)

LRB-P-W-908 - The pressurization subsystem can cause or be jeopardized by lightning or electromagnetic discharge during descent from separation to ocean impact. -- This hazard is not credible. (6 23 88)

LRB-P-W-909 - The pressurization subsystem can cause or be jeopardized by lightning or electromagnetic discharge during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (6 23 88)

LRB-P-W-910 - The pressurization subsystem can cause or be jeopardized by lightning or electromagnetic discharge during floatation (of recoverable boosters) until recovery. -- See comments for W-901. (6 23 88)

LRB-P-W-911 - The pressurization subsystem can cause or be jeopardized by lightning or electromagnetic discharge during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-938 - The pressurization subsystem can cause or be jeopardized by chemical activity during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-939 - The pressurization subsystem can cause or be jeopardized by chemical activity during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-940 - The pressurization subsystem can cause or be jeopardized by chemical activity during proof test of pressure vessels and structure. -- This hazard is not credible. (6 23 88)

LRB-P-W-941 - The pressurization subsystem can cause or be jeopardized by chemical activity during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (6 23 88)

LRB-P-W-942 - The pressurization subsystem can cause or be jeopardized by chemical activity during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-943 - The pressurization subsystem can cause or be jeopardized by chemical activity during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-944 - The pressurization subsystem can cause or be jeopardized by chemical activity during preparation for shipment of the booster and ship loose hardware. -- This hazard is not credible. (6 23 88)

LRB-P-W-945 - The pressurization subsystem can cause or be jeopardized by chemical activity during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (6 23 88)

LRB-P-W-946 - The pressurization subsystem can cause or be jeopardized by

chemical activity during storage, including storage of major components. -- This hazard is not credible. (6 23 88)

LRB-P-W-947 - The pressurization subsystem can cause or be jeopardized by chemical activity during preflight checkout prior to stacking. -- This hazard is not credible. (6 23 88)

LRB-P-W-948 - The pressurization subsystem can cause or be jeopardized by chemical activity during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (6 23 88)

LRB-P-W-949 - The pressurization subsystem can cause or be jeopardized by chemical activity during rollout from the VAB and preloading preparation. -- This hazard is not credible. (6 23 88)

LRB-P-W-950 - The pressurization subsystem can cause or be jeopardized by chemical activity during propellant loading for test or flight. -- This hazard is not credible. (6 23 88)

LRB-P-W-951 - The pressurization subsystem can cause or be jeopardized by chemical activity during countdown to liftoff or abort. -- This hazard is not credible. (6 23 88)

LRB-P-W-952 - The pressurization subsystem can cause or be jeopardized by chemical activity during launch abort activities, including mission postponement (scrub). -- This hazard is not credible. (6 23 88)

LRB-P-W-953 - The pressurization subsystem can cause or be jeopardized by chemical activity during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (6 23 88)

LRB-P-W-954 - The pressurization subsystem can cause or be jeopardized by chemical activity during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (6 23 88)

LRB-P-W-955 - The pressurization subsystem can cause or be jeopardized by chemical activity during separation of the LRB from the STS vehicle. -- This hazard is not credible. (6 23 88)

LRB-P-W-956 - The pressurization subsystem can cause or be jeopardized by chemical activity during descent from separation to ocean impact. -- This hazard is not credible. (6 23 88)

LRB-P-W-957 - The pressurization subsystem can cause or be jeopardized by chemical activity during splashdown events occuring at impact (disposable for expendables). -- The hazard appears to be related to corrosion by seawater.

However, it is expected that recoverable boosters, if used, will be designed to be immune to the corrosive effects of seawater during the period of exposure. (6 23 88)

LRB-P-W-958 - The pressurization subsystem can cause or be jeopardized by chemical activity during floatation (of recoverable boosters) until recovery. -- The hazard appears to be related to corrosion by seawater. However, it is expected that recoverable boosters, if used, will be designed to be immune to the corrosive effects of seawater during the period of exposure. (6 23 88)

LRB-P-W-959 - The pressurization subsystem can cause or be jeopardized by chemical activity during recovery activities, including towing, and retrieval of recoverables. -- The hazard appears to be related to corrosion by seawater. However, it is expected that recoverable boosters, if used, will be designed to be immune to the corrosive effects of seawater during the period of exposure. (6 23 88)

LRB-P-W-960 - The pressurization subsystem can cause or be jeopardized by chemical activity during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-962 - The pressurization subsystem can cause or be jeopardized by computer system malfunction during manufacture and fabrication of subsystems and components. -- This hazard is analyzed as V-746. (6 23 88)

LRB-P-W-963 - The pressurization subsystem can cause or be jeopardized by computer system malfunction during inspection and test of the LRB and subsystems. -- This hazard is analyzed as V-746. (6 23 88)

LRB-P-W-964 - The pressurization subsystem can cause or be jeopardized by computer system malfunction during proof test of pressure vessels and structure. -- This hazard is analyzed as G-748. (6 23 88)

LRB-P-W-965 - The pressurization subsystem can cause or be jeopardized by computer system malfunction during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-966 - The pressurization subsystem can cause or be jeopardized by computer system malfunction during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-967 - The pressurization subsystem can cause or be jeopardized by computer system malfunction during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-969 - The pressurization subsystem can cause or be jeopardized by computer system malfunction during transportation from manufacture to launch site

or after recovery. -- This hazard is not credible. (6 23 88)

LRB-P-W-970 - The pressurization subsystem can cause or be jeopardized by computer system malfunction during storage, including storage of major components. -- This hazard is not credible. (6 23 88)

LRB-P-W-971 - The pressurization subsystem can cause or be jeopardized by computer system malfunction during preflight checkout prior to stacking. -- This hazard is not credible. (6 23 88)

LRB-P-W-972 - The pressurization subsystem can cause or be jeopardized by computer system malfunction during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (6 23 88)

LRB-P-W-973 - The pressurization subsystem can cause or be jeopardized by computer system malfunction during rollout from the VAB and preloading preparation. -- This hazard is not credible. (6 23 88)

LRB-P-W-974 - The pressurization subsystem can cause or be jeopardized by computer system malfunction during propellant loading for test or flight. -- This hazard is analyzed as E-967. (6 23 88)

LRB-P-W-975 - The pressurization subsystem can cause or be jeopardized by computer system malfunction during countdown to liftoff or abort. -- This hazard is analyzed as E-967. (6 23 88)

LRB-P-W-976 - The pressurization subsystem can cause or be jeopardized by computer system malfunction during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as E-967. (6 23 88)

LRB-P-W-977 - The pressurization subsystem can cause or be jeopardized by computer system malfunction during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-978 - The pressurization subsystem can cause or be jeopardized by computer system malfunction during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-979 - The pressurization subsystem can cause or be jeopardized by computer system malfunction during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-980 - The pressurization subsystem can cause or be jeopardized by computer system malfunction during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-981 - The pressurization subsystem can cause or be jeopardized by computer system malfunction during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (6 23 88)

LRB-P-W-982 - The pressurization subsystem can cause or be jeopardized by computer system malfunction during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (6 23 88)

LRB-P-W-983 - The pressurization subsystem can cause or be jeopardized by computer system malfunction during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (6 23 88)

LRB-P-W-984 - The pressurization subsystem can cause or be jeopardized by computer system malfunction during refurbishment of reusable components. -- This hazard is analyzed as V-746. (6 23 88)

LRB-P-W-1034 - The pressurization subsystem can cause or be jeopardized by emergencies during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-1035 - The pressurization subsystem can cause or be jeopardized by emergencies during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-1036 - The pressurization subsystem can cause or be jeopardized by emergencies during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-1037 - The pressurization subsystem can cause or be jeopardized by emergencies during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-1038 - The pressurization subsystem can cause or be jeopardized by emergencies during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-1039 - The pressurization subsystem can cause or be jeopardized by emergencies during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-1040 - The pressurization subsystem can cause or be jeopardized by emergencies during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-1041 - The pressurization subsystem can cause or be jeopardized by emergencies during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-1042 - The pressurization subsystem can cause or be jeopardized by emergencies during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-1043 - The pressurization subsystem can cause or be jeopardized by emergencies during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-1044 - The pressurization subsystem can cause or be jeopardized by emergencies during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-1045 - The pressurization subsystem can cause or be jeopardized by emergencies during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-1046 - The pressurization subsystem can cause or be jeopardized by emergencies during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-1047 - The pressurization subsystem can cause or be jeopardized by emergencies during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-1048 - The pressurization subsystem can cause or be jeopardized by emergencies during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-1049 - The pressurization subsystem can cause or be jeopardized by emergencies during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-1050 - The pressurization subsystem can cause or be jeopardized by emergencies during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-1051 - The pressurization subsystem can cause or be jeopardized by emergencies during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-1052 - The pressurization subsystem can cause or be jeopardized by emergencies during descent from separation to ocean impact. -- This hazard is not

credible. (6 23 88)

LRB-P-W-1053 - The pressurization subsystem can cause or be jeopardized by emergencies during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-1054 - The pressurization subsystem can cause or be jeopardized by emergencies during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-1055 - The pressurization subsystem can cause or be jeopardized by emergencies during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

LRB-P-W-1056 - The pressurization subsystem can cause or be jeopardized by emergencies during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (6 23 88)

THESE HAZARDS WERE CONSIDERED BY THE ANALYST BUT WERE NOT FURTHER ANALYZED FOR THE REASONS GIVEN

LRB-P-X-530 - Personnel can cause or be jeopardized by hazardous environments during manufacture and fabrication of subsystems and components. -- This is a generic industrial safety issue which cannot be analyzed at the present time. This hazard should be evaluated after the manufacturing flow is defined. (6 15 88)

LRB-P-X-531 - Personnel can cause or be jeopardized by hazardous environments during inspection and test of the LRB and subsystems. -- This hazard is analyzed as G-531. (6 15 88)

LRB-P-X-533 - Personnel can cause or be jeopardized by hazardous environments during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (6 15 88)

LRB-P-X-534 - Personnel can cause or be jeopardized by hazardous environments during test firing of engines and/or the completed booster. -- It is assumed that hazardous environments will be correctly assessed and appropriate protective measures will be taken before test firing. At the present time, this hazard cannot be evaluated. (6 15 88)

LRB-P-X-535 - Personnel can cause or be jeopardized by hazardous environments during flight readiness firing (FRF) of the STS vehicle. -- See comment for X-534. (6 15 88)

LRB-P-X-536 - Personnel can cause or be jeopardized by hazardous environments during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (6 15 88)

LRB-P-X-537 - Personnel can cause or be jeopardized by hazardous environments during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 15 88)

LRB-P-X-538 - Personnel can cause or be jeopardized by hazardous environments during storage, including storage of major components. -- It is assumed that safe storage will be provided. (6 15 88)

LRB-P-X-539 - Personnel can cause or be jeopardized by hazardous environments during preflight checkout prior to stacking. -- This hazard is analyzed as G-531. (6 15 88)

LRB-P-X-540 - Personnel can cause or be jeopardized by hazardous environments during vehicle stacking, including ancillary test activities. -- This hazard is analyzed as G-531. (6 15 88)

LRB-P-X-541 - Personnel can cause or be jeopardized by hazardous environments during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (6 15 88)

LRB-P-X-542 - Personnel can cause or be jeopardized by hazardous environments during propellant loading for test or flight. -- This hazard is analyzed as K-579. (6 15 88)

LRB-P-X-543 - Personnel can cause or be jeopardized by hazardous environments during countdown to liftoff or abort. -- This hazard is analyzed as K-579. (6 15 88)

LRB-P-X-544 - Personnel can cause or be jeopardized by hazardous environments during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as K-579. (6 15 88)

LRB P-X-551 - Personnel can cause or be jeopardized by hazardous environments during recovery activities, including towing, and retrieval of recoverables. -- This hazard is analyzed as D-599. (6 15 88)

LRB-P-X-552 - Personnel can cause or be jeopardized by hazardous environments during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (6 15 88)

LRB-P-X-554 - Personnel can cause or be jeopardized by worker overload during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (6 15 88)

LRB-P-X-556 - Personnel can cause or be jeopardized by worker overload during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (6 15 88)

LRB-P-X-557 - Personnel can cause or be jeopardized by worker overload during acceptance test and checkout prior to delivery to the Government. -- This hazard is analyzed as X-555. (6 15 88)

LRB-P-X-558 - Personnel can cause or be jeopardized by worker overload during test firing of engines and/or the completed booster. -- This hazard is analyzed as F-559. (6 15 88)

LRB-P-X-559 - Personnel can cause or be jeopardized by worker overload during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as F-559. (6 15 88)

LRB-P-X-560 - Personnel can cause or be jeopardized by worker overload during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (6 15 88)

LRB-P-X-561 - Personnel can cause or be jeopardized by worker overload during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 15 88)

LRB-P-X-562 - Personnel can cause or be jeopardized by worker overload during storage, including storage of major components. -- This hazard is not credible. (6 15 88)

LRB-P-X-563 - Personnel can cause or be jeopardized by worker overload during preflight checkout prior to stacking. -- This hazard is analyzed as X-555. (6 15 88)

LRB-P-X-564 - Personnel can cause or be jeopardized by worker overload during vehicle stacking, including ancillary test activities. -- This hazard is analyzed as X-555. (6 15 88)

LRB-P-X-565 - Personnel can cause or be jeopardized by worker overload during rollout from the VAB and preloading preparation. -- This hazard is analyzed as X-555. (6 15 88)

LRB-P-X-566 - Personnel can cause or be jeopardized by worker overload during propellant loading for test or flight. -- This hazard is analyzed as F-559. (6 15 88)

LRB-P-X-567 - Personnel can cause or be jeopardized by worker overload during countdown to liftoff or abort. -- This hazard is analyzed as F-559. (6 15 88)

LRB-P-X-568 - Personnel can cause or be jeopardized by worker overload during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (6 15 88)

LRB-P-X-575 - Personnel can cause or be jeopardized by worker overload during recovery activities, including towing, and retrieval of recoverables. -- This hazard is analyzed as X-551. (6 15 88)

LRB-P-X-576 - Personnel can cause or be jeopardized by worker overload during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (6 15 88)

LRB-P-X-578 - Personnel can cause or be jeopardized by unsafe or unhygienic working conditions during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (6 15 88)

LRB-P-X-579 - Personnel can cause or be jeopardized by unsafe or unhygienic working conditions during inspection and test of the LRB and subsystems. -- Various aspects of this hazard are analyzed as I-579, K-579, and N-579. (6 15 88)

LRB-P-X-580 - Personnel can cause or be jeopardized by unsafe or unhygienic working conditions during proof test of pressure vessels and structure. -- This hazard is analyzed as X-532. (6 15 88)

LRB-P-X-581 - Personnel can cause or be jeopardized by unsafe or unhygienic working conditions during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (6 15 88)

LRB-P-X-582 - Personnel can cause or be jeopardized by unsafe or unhygienic working conditions during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (6 15 88)

LRB-P-X-583 - Personnel can cause or be jeopardized by unsafe or unhygienic working conditions during flight readiness firing (FRF) of the STS vehicle. -- It is assumed that the conditions for FRF will provide sufficient safety for all persons involved. (6 15 88)

LRB-P-X-584 - Personnel can cause or be jeopardized by unsafe or unhygienic working conditions during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (6 15 88)

LRB-P-X-585 - Personnel can cause or be jeopardized by unsafe or unhygienic working conditions during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 15 88)

LRB-P-X-586 - Personnel can cause or be jeopardized by unsafe or unhygienic working conditions during storage, including storage of major components. -- It is assumed that safe storage will be provided. (6 15 88)

LRB-P-X-587 - Personnel can cause or be jeopardized by unsafe or unhygienic working conditions during preflight checkout prior to stacking. -- This hazard is analyzed as G-531. (6 15 88)

LRB-P-X-588 - Personnel can cause or be jeopardized by unsafe or unhygienic working conditions during vehicle stacking, including ancillary test activities. -- This hazard is analyzed as G-531 and F-588. (6 15 88)

LRB-P-X-589 - Personnel can cause or be jeopardized by unsafe or unhygienic working conditions during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (6 15 88)

LRB-P-X-590 - Personnel can cause or be jeopardized by unsafe or unhygienic working conditions during propellant loading for test or flight. -- This hazard is

analyzed as F-559. (6 15 88)

LRB-P-X-591 - Personnel can cause or be jeopardized by unsafe or unhygienic working conditions during countdown to liftoff or abort. -- This hazard is analyzed as F-559. (6 15 88)

LRB-P-X-592 - Personnel can cause or be jeopardized by unsafe or unhygienic working conditions during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (6 15 88)

LRB-P-X-599 - Personnel can cause or be jeopardized by unsafe or unhygienic working conditions during recovery activities, including towing, and retrieval of recoverables. -- This hazard is evaluated as D-599. (6 15 88)

LRB-P-X-600 - Personnel can cause or be jeopardized by unsafe or unhygienic working conditions during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (6 15 88)

LRB-P-X-650 - Personnel can cause or be jeopardized by contamination during manufacture and fabrication of subsystems and components. -- This hazard is analyzed as S-578. (6 15 88)

LRB-P-X-651 - Personnel can cause or be jeopardized by contamination during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (6 15 88)

LRB-P-X-652 - Personnel can cause or be jeopardized by contamination during proof test of pressure vessels and structure. -- This hazard is not credible. (6 15 88)

LRB-P-X-653 - Personnel can cause or be jeopardized by contamination during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (6 15 88)

LRB-P-X-654 - Personnel can cause or be jeopardized by contamination during test firing of engines and/or the completed booster. -- This hazard is not credible. (6 15 88)

LRB-P-X-655 - Personnel can cause or be jeopardized by contamination during flight readiness firing (FRF) of the STS vehicle. -- This hazard is not credible. (6 15 88)

LRB-P-X-656 - Personnel can cause or be jeopardized by contamination during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (6 15 88)

LRB-P-X-657 - Personnel can cause or be jeopardized by contamination during

transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (6 15 88)

LRB-P-X-658 - Personnel can cause or be jeopardized by contamination during storage, including storage of major components. -- This hazard is not credible. (6 15 88)

LRB-P-X-659 - Personnel can cause or be jeopardized by contamination during preflight checkout prior to stacking. -- This hazard is not credible. (6 15 88)

LRB-P-X-660 - Personnel can cause or be jeopardized by contamination during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (6 15 88)

LRB-P-X-661 - Personnel can cause or be jeopardized by contamination during rollout from the VAB and preloading preparation. -- This hazard is not credible. (6 15 88)

LRB-P-X-662 - Personnel can cause or be jeopardized by contamination during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (6 15 88)

LRB-P-X-663 - Personnel can cause or be jeopardized by contamination during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (6 15 88)

LRB-P-X-664 - Personnel can cause or be jeopardized by contamination during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (6 15 88)

LRB-P-X-671 - Personnel can cause or be jeopardized by contamination during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (6 15 88)

LRB-P-X-672 - Personnel can cause or be jeopardized by contamination during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (6 15 88)

LRB-P-X-678 - Personnel can cause or be jeopardized by heat sources during test firing of engines and/or the completed booster. -- It is assumed that personnel will be adequately protected during test firing. (6 15 88)

LRB-P-X-679 - Personnel can cause or be jeopardized by heat sources during flight readiness firing (FRF) of the STS vehicle. -- It is assumed that personnel will be adequately protected during test firing. (6 15 88)

LRB-P-X-681 - Personnel can cause or be jeopardized by heat sources during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (6 15 88)

LRB-P-X-682 - Personnel can cause or be jeopardized by heat sources during storage, including storage of major components. -- This hazard is not credible. (6 15 88)

LRB-P-X-685 - Personnel can cause or be jeopardized by heat sources during rollout from the VAB and preloading preparation. -- This hazard is not credible. (6 15 88)

LRB-P-X-686 - Personnel can cause or be jeopardized by heat sources during propellant loading for test or flight. -- Hazards of personnel exposure to heat sinks, (cryogens) are analyzed in K-579. (6 15 88)

LRB-P-X-687 - Personnel can cause or be jeopardized by heat sources during countdown to liftoff or abort. -- Hazards of personnel exposure to heat sinks (cryogens) are analyzed in K-579. (6 15 88)

LRB-P-X-699 - Personnel can cause or be jeopardized by radiation or sunlight during inspection and test of the LRB and subsystems. -- Although there is a slight hazard of contact with heated surfaces, this hazard is not significantly greater with the LRB system than currently. Therefore, this is not specifically a LRB hazard. (6 15 88)

LRB-P-X-701 - Personnel can cause or be jeopardized by radiation or sunlight during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (6 16 88)

LRB-P-X-702 - Personnel can cause or be jeopardized by radiation or sunlight during test firing of engines and/or the completed booster. -- This hazard is not credible. (6 16 88)

LRB-P-X-703 - Personnel can cause or be jeopardized by radiation or sunlight during flight readiness firing (FRF) of the STS vehicle. -- This hazard is not credible. (6 16 88)

LRB-P-X-705 - Personnel can cause or be jeopardized by radiation or sunlight during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (6 16 88)

LRB-P-X-708 - Personnel can cause or be jeopardized by radiation or sunlight during vehicle stacking, including ancillary test activities. -- Currently, there does not appear to be a requirement for a radio transmission capability for the LRB. If such a capability is required, consideration should be given to protection of personnel from

RF energy during testing. (6 16 88)

LRB-P-X-709 - Personnel can cause or be jeopardized by radiation or sunlight during rollout from the VAB and preloading preparation. -- This hazard is not credible. (6 16 88)

LRB-P-X-710 - Personnel can cause or be jeopardized by radiation or sunlight during propellant loading for test or flight. -- This hazard is not credible. (6 16 88)

LRB-P-X-711 - Personnel can cause or be jeopardized by radiation or sunlight during countdown to liftoff or abort. -- This hazard is not credible. (6 16 88)

LRB-P-X-712 - Personnel can cause or be jeopardized by radiation or sunlight during launch abort activities, including mission postponement (scrub). -- This hazard is not credible. (6 16 88)

LRB-P-X-719 - Personnel can cause or be jeopardized by radiation or sunlight during recovery activities, including towing, and retrieval of recoverables. -- The current baseline does not include a requirement for radio locator beacons. If such a capability is required in the future, consideration should be given to hazards associated with such equipment. (6 16 88)

LRB-P-X-720 - Personnel can cause or be jeopardized by radiation or sunlight during refurbishment of reusable components. -- X-ray or neutron imaging techniques for inspection might be hazardous to workers, but these concerns cannot be properly evaluated at the current state of design maturity. (6 16 88)

LRB-P-X-746 - Personnel can cause or be jeopardized by electrical system malfunction during manufacture and fabrication of subsystems and components. -- This appears to be a generic industrial safety issue. (6 16 88)

LRB-P-X-748 - Personnel can cause or be jeopardized by electrical system malfunction during proof test of pressure vessels and structure. -- This hazard is analyzed as G-748. (6 16 88)

LRB-P-X-749 - Personnel can cause or be jeopardized by electrical system malfunction during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (6 16 88)

LRB-P-X-750 - Personnel can cause or be jeopardized by electrical system malfunction during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (6 16 88)

LRB-P-X-751 - Personnel can cause or be jeopardized by electrical system malfunction during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 16 88)

LRB-P-X-752 - Personnel can cause or be jeopardized by electrical system malfunction during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (6 16 88)

LRB-P-X-753 - Personnel can cause or be jeopardized by electrical system malfunction during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 16 88)

LRB-P-X-754 - Personnel can cause or be jeopardized by electrical system malfunction during storage, including storage of major components. -- This hazard is not credible. (6 16 88)

LRB-P-X-755 - Personnel can cause or be jeopardized by electrical system malfunction during preflight checkout prior to stacking. -- This hazard is analyzed as X-747. (6 16 88)

LRB-P-X-756 - Personnel can cause or be jeopardized by electrical system malfunction during vehicle stacking, including ancillary test activities. -- This hazard is analyzed as X-747. (6 16 88)

LRB-P-X-757 - Personnel can cause or be jeopardized by electrical system malfunction during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (6 16 88)

LRB-P-X-758 - Personnel can cause or be jeopardized by electrical system malfunction during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (6 16 88)

LRB-P-X-759 - Personnel can cause or be jeopardized by electrical system malfunction during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (6 16 88)

LRB-P-X-760 - Personnel can cause or be jeopardized by electrical system malfunction during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (6 16 88)

LRB-P-X-767 - Personnel can cause or be jeopardized by electrical system malfunction during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (6 16 88)

LRB-P-X-768 - Personnel can cause or be jeopardized by electrical system malfunction during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (6 16 88)

LRB-P-X-772 - Personnel can cause or be jeopardized by differential pressure during proof test of pressure vessels and structure. -- This hazard is analyzed as X-532. (6 16 88)

LRB-P-X-774 - Personnel can cause or be jeopardized by differential pressure during test firing of engines and/or the completed booster. -- Personnel injury would be a secondary effect of damage to other systems which are analyzed separately. (6 16 88)

LRB-P-X-775 - Personnel can cause or be jeopardized by differential pressure during flight readiness firing (FRF) of the STS vehicle. -- Personnel injury would be a secondary effect of damage to other systems which are analyzed separately. (6 16 88)

LRB-P-X-777 - Personnel can cause or be jeopardized by differential pressure during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 16 88)

LRB-P-X-778 - Personnel can cause or be jeopardized by differential pressure during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (6 16 88)

LRB-P-X-782 - Personnel can cause or be jeopardized by differential pressure during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (6 16 88)

LRB-P-X-783 - Personnel can cause or be jeopardized by differential pressure during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (6 16 88)

LRB-P-X-784 - Personnel can cause or be jeopardized by differential pressure during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (6 16 88)

LRB-P-X-791 - Personnel can cause or be jeopardized by differential pressure during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (6 16 88)

LRB-P-X-798 - Personnel can cause or be jeopardized by vibration, acoustic loads or shock during test firing of engines and/or the completed booster. -- It is assumed that personnel will be adequately protected from all energy sources which might be hazardous during test firing. (6 16 88)

LRB-P-X-799 - Personnel can cause or be jeopardized by vibration, acoustic loads or shock during flight readiness firing (FRF) of the STS vehicle. -- It is assumed that personnel will be adequately protected from all energy sources which might be hazardous during test firing. (6 16 88)

LRB-P-X-801 - Personnel can cause or be jeopardized by vibration, acoustic loads or shock during transportation from manufacture to launch site or after recovery. --

This hazard is not credible. (6 16 88)

LRB-P-X-808 - Personnel can cause or be jeopardized by vibration, acoustic loads or shock during launch abort activities, including mission postponement (scrub). -- It is assumed that personnel will be adequately protected until the STS vehicle is in a safed configuration which would not produce adverse acoustic environments. (6 16 88)

LRB-P-X-815 - Personnel can cause or be jeopardized by vibration, acoustic loads or shock during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (6 16 88)

LRB-P-X-870 - Personnel can cause or be jeopardized by propellant characteristics and products during test firing of engines and/or the completed booster. -- This hazard is analyzed as K-579. (6 16 88)

LRB-P-X-871 - Personnel can cause or be jeopardized by propellant characteristics and products during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 16 88)

LRB-P-X-873 - Personnel can cause or be jeopardized by propellant characteristics and products during transportation from manufacture to launch site or after recovery. -- This hazard is analyzed as P-1041. (6 16 88)

LRB-P-X-874 - Personnel can cause or be jeopardized by propellant characteristics and products during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (6 16 88)

LRB-P-X-877 - Personnel can cause or be jeopardized by propellant characteristics and products during rollout from the VAB and preloading preparation. -- This hazard is analyzed as K-579. (6 16 88)

LRB-P-X-878 - Personnel can cause or be jeopardized by propellant characteristics and products during propellant loading for test or flight. -- This hazard is analyzed as K-579. (6 16 88)

LRB-P-X-879 - Personnel can cause or be jeopardized by propellant characteristics and products during countdown to liftoff or abort. -- This hazard is analyzed as K-579. (6 16 88)

LRB-P-X-880 - Personnel can cause or be jeopardized by propellant characteristics and products during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as K-579. (6 16 88)

LRB-P-X-887 - Personnel can cause or be jeopardized by propellant characteristics and products during recovery activities, including towing, and retrieval of

recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (6 16 88)

LRB-P-X-888 - Personnel can cause or be jeopardized by propellant characteristics and products during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (6 16 88)

LRB-P-X-894 - Personnel can cause or be jeopardized by lightning or electromagnetic discharge during test firing of engines and/or the completed booster. -- Personnel injury would be a secondary effect of damage to other systems which is analyzed separately. (6 16 88)

LRB-P-X-895 - Personnel can cause or be jeopardized by lightning or electromagnetic discharge during flight readiness firing (FRF) of the STS vehicle. -- Personnel injury would be a secondary effect of damage to other systems which is analyzed separately. (6 16 88)

LRB-P-X-898 - Personnel can cause or be jeopardized by lightning or electromagnetic discharge during storage, including storage of major components. -- It is assumed that LRBs will be stored where they are not exposed to the adverse effects of lightning. (6 16 88)

LRB-P-X-901 - Personnel can cause or be jeopardized by lightning or electromagnetic discharge during rollout from the VAB and preloading preparation. -- Personnel injury would be a secondary effect of damage to other systems which is analyzed separately. See also S-901. (6 16 88)

LRB-P-X-902 - Personnel can cause or be jeopardized by lightning or electromagnetic discharge during propellant loading for test or flight. -- Personnel injury would be a secondary effect of damage to other systems which is analyzed separately. See also S-901. (6 16 88)

LRB-P-X-903 - Personnel can cause or be jeopardized by lightning or electromagnetic discharge during countdown to liftoff or abort. -- Personnel injury would be a secondary effect of damage to other systems which is analyzed separately. See also S-901. (6 16 88)

LRB-P-X-904 - Personnel can cause or be jeopardized by lightning or electromagnetic discharge during launch abort activities, including mission postponement (scrub). -- Personnel injury would be a secondary effect of damage to other systems which is analyzed separately. See also S-901. (6 16 88)

LRB-P-X-911 - Personnel can cause or be jeopardized by lightning or electromagnetic discharge during recovery activities, including towing, and retrieval of recoverables. -- The hazard of lightning strike to the LRB during recovery does not appear to be significantly greater than the hazard posed by lightning strike on the

recovery vehicle. Both situations represent a low impedence path to the seawater ground. (6 16 88)

LRB-P-X-913 - Personnel can cause or be jeopardized by faulty documentation during component or material purchase, including acquisition of GFP. -- At the current state of maturity, this hazard cannot be evaluated. (6 16 88)

LRB-P-X-914 - Personnel can cause or be jeopardized by faulty documentation during manufacture and fabrication of subsystems and components. -- This appears to be a generic industrial safety issue. The facility, tooling and production operations must be examined step by step to insure that all hazards to personnel are identified and properly controlled. (6 16 88)

LRB-P-X-915 - Personnel can cause or be jeopardized by faulty documentation during inspection and test of the LRB and subsystems. -- This appears to be an industrial safety issue. See X-914. (6 16 88)

LRB-P-X-916 - Personnel can cause or be jeopardized by faulty documentation during proof test of pressure vessels and structure. -- This appears to be an industrial safety issue. See X-914. (6 16 88)

LRB-P-X-917 - Personnel can cause or be jeopardized by faulty documentation during acceptance test and checkout prior to delivery to the Government. -- This appears to be an industrial safety issue. See X-914. (6 16 88)

LRB-P-X-918 - Personnel can cause or be jeopardized by faulty documentation during test firing of engines and/or the completed booster. -- This appears to be an industrial safety issue. See X-914. (6 16 88)

LRB-P-X-919 - Personnel can cause or be jeopardized by faulty documentation during flight readiness firing (FRF) of the STS vehicle. -- This appears to be an industrial safety issue. See X-914. (6 16 88)

LRB-P-X-920 - Personnel can cause or be jeopardized by faulty documentation during preparation for shipment of the booster and ship loose hardware. -- This appears to be an industrial safety issue. See X-914. (6 16 88)

LRB-P-X-921 - Personnel can cause or be jeopardized by faulty documentation during transportation from manufacture to launch site or after recovery. -- This appears to be an industrial safety issue. See X-914. (6 16 88)

LRB-P-X-922 - Personnel can cause or be jeopardized by faulty documentation during storage, including storage of major components. -- This appears to be an industrial safety issue. See X-914. (6 16 88)

LRB-P-X-923 - Personnel can cause or be jeopardized by faulty documentation

during preflight checkout prior to stacking. -- This appears to be an industrial safety issue. See X-914. (6 16 88)

LRB-P-X-924 - Personnel can cause or be jeopardized by faulty documentation during vehicle stacking, including ancillary test activities. -- This appears to be an industrial safety issue. See X-914. (6 16 88)

LRB-P-X-925 - Personnel can cause or be jeopardized by faulty documentation during rollout from the VAB and preloading preparation. -- This appears to be an industrial safety issue. See X-914. (6 16 88)

LRB-P-X-926 - Personnel can cause or be jeopardized by faulty documentation during propellant loading for test or flight. -- This appears to be an industrial safety issue. See X-914. (6 16 88)

LRB-P-X-927 - Personnel can cause or be jeopardized by faulty documentation during countdown to liftoff or abort. -- This appears to be an industrial safety issue. See X-914. (6 16 88)

LRB-P-X-928 - Personnel can cause or be jeopardized by faulty documentation during launch abort activities, including mission postponement (scrub). -- This appears to be an industrial safety issue. See X-914. (6 16 88)

LRB-P-X-935 - Personnel can cause or be jeopardized by faulty documentation during recovery activities, including towing, and retrieval of recoverables. -- This appears to be an industrial safety issue. See X-914. (6 16 88)

LRB-P-X-936 - Personnel can cause or be jeopardized by faulty documentation during refurbishment of reusable components. -- This appears to be an industrial safety issue. See X-914. (6 16 88)

LRB-P-X-962 - Personnel can cause or be jeopardized by computer system malfunction during manufacture and fabrication of subsystems and components. -- This hazard is analyzed as V-746. (6 16 88)

LRB-P-X-963 - Personnel can cause or be jeopardized by computer system malfunction during inspection and test of the LRB and subsystems. -- This hazard is analyzed as V-746 and E-963. (6 16 88)

LRB-P-X-964 - Personnel can cause or be jeopardized by computer system malfunction during proof test of pressure vessels and structure. -- This hazard is analyzed as V-746, G-748 and X-532. (6 16 88)

LRB-P-X-965 - Personnel can cause or be jeopardized by computer system malfunction during acceptance test and checkout prior to delivery to the Government. -- This hazard is analyzed as V-746. (6 16 88)

LRB-P-X-966 - Personnel can cause or be jeopardized by computer system malfunction during test firing of engines and/or the completed booster. -- This hazard is analyzed as V-746. (6 16 88)

LRB-P-X-967 - Personnel can cause or be jeopardized by computer system malfunction during flight readiness firing (FRF) of the STS vehicle. -- Personnel injury would be a secondary effect of the hazard analyzed as E-967. (6 16 88)

LRB-P-X-969 - Personnel can cause or be jeopardized by computer system malfunction during transportation from manufacture to launch site or after recovery. -- This hazard is analyzed as V-746. (6 16 88)

LRB-P-X-970 - Personnel can cause or be jeopardized by computer system malfunction during storage, including storage of major components. -- This hazard is analyzed as V-746. (6 16 88)

LRB-P-X-971 - Personnel can cause or be jeopardized by computer system malfunction during preflight checkout prior to stacking. -- This hazard is analyzed as V-746. See also A-971. (6 16 88)

LRB-P-X-972 - Personnel can cause or be jeopardized by computer system malfunction during vehicle stacking, including ancillary test activities. -- This hazard is analyzed as V-746. (6 16 88)

LRB-P-X-973 - Personnel can cause or be jeopardized by computer system malfunction during rollout from the VAB and preloading preparation. -- This hazard is analyzed as V-746. (6 16 88)

LRB-P-X-974 - Personnel can cause or be jeopardized by computer system malfunction during propellant loading for test or flight. -- This hazard is analyzed as V-746. (6 16 88)

LRB-P-X-975 - Personnel can cause or be jeopardized by computer system malfunction during countdown to liftoff or abort. -- This hazard is analyzed as V-746. See also A-975. (6 16 88)

LRB-P-X-976 - Personnel can cause or be jeopardized by computer system malfunction during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as A-975. (6 16 88)

LRB-P-X-983 - Personnel can cause or be jeopardized by computer system malfunction during recovery activities, including towing, and retrieval of recoverables. -- This hazard is analyzed as V-746. (6 16 88)

LRB-P-X-984 - Personnel can cause or be jeopardized by computer system malfunction during refurbishment of reusable components. -- This hazard is analyzed as V-746. (6 16 88)

LRB-P-X-986 - Personnel can cause or be jeopardized by operator error during manufacture and fabrication of subsystems and components. -- This appears to be a generic industrial safety issue not peculiar to the LRB. (6 16 88)

LRB-P-X-988 - Personnel can cause or be jeopardized by operator error during proof test of pressure vessels and structure. -- This hazard is analyzed as G-988. (6 16 88)

LRB-P-X-989 - Personnel can cause or be jeopardized by operator error during acceptance test and checkout prior to delivery to the Government. -- This hazard is analyzed as X-987. (6 16 88)

LRB-P-X-990 - Personnel can cause or be jeopardized by operator error during test firing of engines and/or the completed booster. -- This hazard is analyzed as X-987. (6 16 88)

LRB-P-X-991 - Personnel can cause or be jeopardized by operator error during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as X-987. (6 16 88)

LRB-P-X-992 - Personnel can cause or be jeopardized by operator error during preparation for shipment of the booster and ship loose hardware. -- This hazard is analyzed as X-987. (6 16 88)

LRB-P-X-993 - Personnel can cause or be jeopardized by operator error during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 16 88)

LRB-P-X-994 - Personnel can cause or be jeopardized by operator error during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (6 16 88)

LRB-P-X-995 - Personnel can cause or be jeopardized by operator error during preflight checkout prior to stacking. -- This hazard is analyzed as X-987. (6 16 88)

LRB-P-X-996 - Personnel can cause or be jeopardized by operator error during vehicle stacking, including ancillary test activities. -- This hazard is analyzed as X-987. (6 16 88)

LRB-P-X-997 - Personnel can cause or be jeopardized by operator error during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (6 16 88)

LRB-P-X-998 - Personnel can cause or be jeopardized by operator error during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (6 16 88)

LRB-P-X-999 - Personnel can cause or be jeopardized by operator error during countdown to liftoff or abort. -- This hazard is analyzed as G-991. (6 16 88)

LRB-P-X-1000 - Personnel can cause or be jeopardized by operator error during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as G-991. (6 16 88)

LRB-P-X-1007 - Personnel can cause or be jeopardized by operator error during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (6 16 88)

LRB-P-X-1008 - Personnel can cause or be jeopardized by operator error during refurbishment of reusable components. -- This hazard is analyzed as X-987. (6 16 88)

LRB-P-X-1034 - Personnel can cause or be jeopardized by emergencies during manufacture and fabrication of subsystems and components. -- This appears to be a generic industrial safety issue not specific to the LRB. However, See B-1034. (6 16 88)

LRB-P-X-1035 - Personnel can cause or be jeopardized by emergencies during inspection and test of the LRB and subsystems. -- This appears to be a generic industrial safety issue, not specific to the LRB. However, see B-987. (6 16 88)

LRB-P-X-1036 - Personnel can cause or be jeopardized by emergencies during proof test of pressure vessels and structure. -- This hazard is analyzed as X-532. (6 16 88)

LRB-P-X-1037 - Personnel can cause or be jeopardized by emergencies during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (6 16 88)

LRB-P-X-1038 - Personnel can cause or be jeopardized by emergencies during test firing of engines and/or the completed booster. -- See F-1039. (6 16 88)

LRB-P-X-1039 - Personnel can cause or be jeopardized by emergencies during flight readiness firing (FRF) of the STS vehicle. -- See F-1039. (6 16 88)

LRB-P-X-1040 - Personnel can cause or be jeopardized by emergencies during preparation for shipment of the booster and ship loose hardware. -- See B-1041. (6 16 88)

LRB-P-X-1041 - Personnel can cause or be jeopardized by emergencies during transportation from manufacture to launch site or after recovery. -- See B-1041. (6 16 88)

LRB-P-X-1042 - Personnel can cause or be jeopardized by emergencies during storage, including storage of major components. -- This appears to be a generic industrial safety issue, not specific to the LRB. (6 16 88)

LRB-P-X-1043 - Personnel can cause or be jeopardized by emergencies during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (6 16 88)

LRB-P-X-1044 - Personnel can cause or be jeopardized by emergencies during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (6 16 88)

LRB-P-X-1045 - Personnel can cause or be jeopardized by emergencies during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (6 16 88)

LRB-P-X-1046 - Personnel can cause or be jeopardized by emergencies during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (6 16 88)

LRB-P-X-1047 - Personnel can cause or be jeopardized by emergencies during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (6 16 88)

LRB-P-X-1048 - Personnel can cause or be jeopardized by emergencies during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (6 16 88)

LRB-P-X-1055 - Personnel can cause or be jeopardized by emergencies during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (6 16 88)

LRB-P-X-1056 - Personnel can cause or be jeopardized by emergencies during refurbishment of reusable components. -- This appears to be a generic industrial safety issue, not specific to the LRB. (6 16 88)

THESE HAZARDS WERE CONSIDERED BY THE ANALYST BUT WERE NOT FURTHER ANALYZED FOR THE REASONS GIVEN

LRB-P-Y-554 - Controls and displays can cause or be jeopardized by worker overload during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (6 17 88)

LRB-P-Y-555 - Controls and displays can cause or be jeopardized by worker overload during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (6 17 88)

LRB-P-Y-556 - Controls and displays can cause or be jeopardized by worker overload during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (6 17 88)

LRB-P-Y-557 - Controls and displays can cause or be jeopardized by worker overload during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (6 17 88)

LRB-P-Y-558 - Controls and displays can cause or be jeopardized by worker overload during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (6 17 88)

LRB-P-Y-559 - Controls and displays can cause or be jeopardized by worker overload during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as F-559. (6 17 88)

LRB-P-Y-560 - Controls and displays can cause or be jeopardized by worker overload during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (6 17 88)

LRB-P-Y-561 - Controls and displays can cause or be jeopardized by worker overload during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 17 88)

LRB-P-Y-562 - Controls and displays can cause or be jeopardized by worker overload during storage, including storage of major components. -- This hazard is not credible. (6 17 88)

LRB-P-Y-563 - Controls and displays can cause or be jeopardized by worker overload during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (6 17 88)

LRB-P-Y-564 - Controls and displays can cause or be jeopardized by worker overload during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (6 17 88)

LRB-P-Y-565 - Controls and displays can cause or be jeopardized by worker overload during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (6 17 88)

LRB-P-Y-566 - Controls and displays can cause or be jeopardized by worker overload during propellant loading for test or flight. -- This hazard is analyzed as F-559. (6 17 88)

LRB-P-Y-567 - Controls and displays can cause or be jeopardized by worker overload during countdown to liftoff or abort. -- This hazard is analyzed as F-559. (6 17 88)

LRB-P-Y-574 - Controls and displays can cause or be jeopardized by worker overload during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 17 88)

LRB-P-Y-575 - Controls and displays can cause or be jeopardized by worker overload during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (6 17 88)

LRB-P-Y-578 - Controls and displays can cause or be jeopardized by unsafe or unhygienic working conditions during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-579 - Controls and displays can cause or be jeopardized by unsafe or unhygienic working conditions during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-580 - Controls and displays can cause or be jeopardized by unsafe or unhygienic working conditions during proof test of pressure vessels and structure. -- This hazard is analyzed as G-748. (6 20 88)

LRB-P-Y-581 - Controls and displays can cause or be jeopardized by unsafe or unhygienic working conditions during acceptance test and checkout prior to delivery to the Government. -- This hazard is analyzed as E-747 (6 20 88)

LRB-P-Y-582 - Controls and displays can cause or be jeopardized by unsafe or unhygienic working conditions during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-583 - Controls and displays can cause or be jeopardized by unsafe or unhygienic working conditions during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-584 - Controls and displays can cause or be jeopardized by unsafe or unhygienic working conditions during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-585 - Controls and displays can cause or be jeopardized by unsafe or unhygienic working conditions during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-586 - Controls and displays can cause or be jeopardized by unsafe or unhygienic working conditions during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-587 - Controls and displays can cause or be jeopardized by unsafe or unhygienic working conditions during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-588 - Controls and displays can cause or be jeopardized by unsafe or unhygienic working conditions during vehicle stacking, including ancillary test activities. -- This hazard is analyzed as E-747. (6 20 88)

LRB-P-Y-589 - Controls and displays can cause or be jeopardized by unsafe or unhygienic working conditions during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-590 - Controls and displays can cause or be jeopardized by unsafe or unhygienic working conditions during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-591 - Controls and displays can cause or be jeopardized by unsafe or unhygienic working conditions during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-592 - Controls and displays can cause or be jeopardized by unsafe or unhygienic working conditions during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-598 - Controls and displays can cause or be jeopardized by unsafe or unhygienic working conditions during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-599 - Controls and displays can cause or be jeopardized by unsafe or unhygienic working conditions during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-600 - Controls and displays can cause or be jeopardized by unsafe or unhygienic working conditions during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-746 - Controls and displays can cause or be jeopardized by electrical system malfunction during manufacture and fabrication of subsystems and components. -- This hazard is analyzed as E-747 and V-746. (6 20 88)

LRB-P-Y-747 - Controls and displays can cause or be jeopardized by electrical system malfunction during inspection and test of the LRB and subsystems. -- This hazard is analyzed as E-747. (6 20 88)

LRB-P-Y-748 - Controls and displays can cause or be jeopardized by electrical system malfunction during proof test of pressure vessels and structure. -- This hazard is analyzed as G-748. (6 20 88)

LRB-P-Y-749 - Controls and displays can cause or be jeopardized by electrical system malfunction during acceptance test and checkout prior to delivery to the Government. -- This hazard is analyzed as E-747. (6 20 88)

LRB-P-Y-750 - Controls and displays can cause or be jeopardized by electrical system malfunction during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-751 - Controls and displays can cause or be jeopardized by electrical system malfunction during flight readiness firing (FRF) of the STS vehicle. -- It is assumed that loss of data from the STS vehicle will result in automatic termination of any test firing. (6 20 88)

LRB-P-Y-752 - Controls and displays can cause or be jeopardized by electrical system malfunction during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-753 - Controls and displays can cause or be jeopardized by electrical system malfunction during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-754 - Controls and displays can cause or be jeopardized by electrical system malfunction during storage, including storage of major components. -- At the

current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-755 - Controls and displays can cause or be jeopardized by electrical system malfunction during preflight checkout prior to stacking. -- This hazard is analyzed as E-747. (6 20 88)

LRB-P-Y-756 - Controls and displays can cause or be jeopardized by electrical system malfunction during vehicle stacking, including ancillary test activities. -- This hazard is analyzed as E-747. (6 20 88)

LRB-P-Y-757 - Controls and displays can cause or be jeopardized by electrical system malfunction during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-758 - Controls and displays can cause or be jeopardized by electrical system malfunction during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-759 - Controls and displays can cause or be jeopardized by electrical system malfunction during countdown to liftoff or abort. -- It is assumed that loss of necessary electrical power for LRB monitoring will be cause to stop the countdown and safe the vehicle. (6 20 88)

LRB-P-Y-760 - Controls and displays can cause or be jeopardized by electrical system malfunction during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-761 - Controls and displays can cause or be jeopardized by electrical system malfunction during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-762 - Controls and displays can cause or be jeopardized by electrical system malfunction during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-763 - Controls and displays can cause or be jeopardized by electrical system malfunction during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-766 - Controls and displays can cause or be jeopardized by electrical system malfunction during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-767 - Controls and displays can cause or be jeopardized by electrical system malfunction during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-768 - Controls and displays can cause or be jeopardized by electrical system malfunction during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-913 - Controls and displays can cause or be jeopardized by faulty documentation during component or material purchase, including acquisition of GFP. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-914 - Controls and displays can cause or be jeopardized by faulty documentation during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-915 - Controls and displays can cause or be jeopardized by faulty documentation during inspection and test of the LRB and subsystems. -- Hazards can be caused by faulty test documentation whenever such documentation is used. However, at the present time, it is not possible to identify the specific risks involved as they pertain to the LRB. This appears to be a generic hazard. (6 20 88)

LRB-P-Y-916 - Controls and displays can cause or be jeopardized by faulty documentation during proof test of pressure vessels and structure. -- See comments on Y-915. (6 20 88)

LRB-P-Y-917 - Controls and displays can cause or be jeopardized by faulty documentation during acceptance test and checkout prior to delivery to the Government. -- See comments on Y-915. (6 20 88)

LRB-P-Y-918 - Controls and displays can cause or be jeopardized by faulty documentation during test firing of engines and/or the completed booster. -- See comments on Y-915. (6 20 88)

LRB-P-Y-919 - Controls and displays can cause or be jeopardized by faulty documentation during flight readiness firing (FRF) of the STS vehicle. -- See comments on Y-915. (6 20 88)

LRB-P-Y-920 - Controls and displays can cause or be jeopardized by faulty documentation during preparation for shipment of the booster and ship loose hardware. -- See comments on Y-915. (6 20 88)

LRB-P-Y-921 - Controls and displays can cause or be jeopardized by faulty documentation during transportation from manufacture to launch site or after recovery. -- See comments on Y-915. (6 20 88)

LRB-P-Y-922 - Controls and displays can cause or be jeopardized by faulty documentation during storage, including storage of major components. -- See comments on Y-915. (6 20 88)

LRB-P-Y-923 - Controls and displays can cause or be jeopardized by faulty documentation during preflight checkout prior to stacking. -- See comments on Y-915. (6 20 88)

LRB-P-Y-924 - Controls and displays can cause or be jeopardized by faulty documentation during vehicle stacking, including ancillary test activities. -- See comments on Y-915. (6 20 88)

LRB-P-Y-925 - Controls and displays can cause or be jeopardized by faulty documentation during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-926 - Controls and displays can cause or be jeopardized by faulty documentation during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-927 - Controls and displays can cause or be jeopardized by faulty documentation during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-928 - Controls and displays can cause or be jeopardized by faulty documentation during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-929 - Controls and displays can cause or be jeopardized by faulty documentation during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-930 - Controls and displays can cause or be jeopardized by faulty documentation during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-931 - Controls and displays can cause or be jeopardized by faulty documentation during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-935 - Controls and displays can cause or be jeopardized by faulty documentation during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-936 - Controls and displays can cause or be jeopardized by faulty documentation during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-962 - Controls and displays can cause or be jeopardized by computer

system malfunction during manufacture and fabrication of subsystems and components. -- This hazard is analyzed as V-746. (6 20 88)

LRB-P-Y-963 - Controls and displays can cause or be jeopardized by computer system malfunction during inspection and test of the LRB and subsystems. -- This hazard is analyzed as E-747. (6 20 88)

LRB-P-Y-964 - Controls and displays can cause or be jeopardized by computer system malfunction during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-965 - Controls and displays can cause or be jeopardized by computer system malfunction during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-966 - Controls and displays can cause or be jeopardized by computer system malfunction during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-967 - Controls and displays can cause or be jeopardized by computer system malfunction during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-969 - Controls and displays can cause or be jeopardized by computer system malfunction during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-970 - Controls and displays can cause or be jeopardized by computer system malfunction during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-971 - Controls and displays can cause or be jeopardized by computer system malfunction during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-972 - Controls and displays can cause or be jeopardized by computer system malfunction during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-973 - Controls and displays can cause or be jeopardized by computer system malfunction during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-974 - Controls and displays can cause or be jeopardized by computer

system malfunction during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-975 - Controls and displays can cause or be jeopardized by computer system malfunction during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-976 - Controls and displays can cause or be jeopardized by computer system malfunction during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-977 - Controls and displays can cause or be jeopardized by computer system malfunction during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-978 - Controls and displays can cause or be jeopardized by computer system malfunction during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-979 - Controls and displays can cause or be jeopardized by computer system malfunction during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-982 - Controls and displays can cause or be jeopardized by computer system malfunction during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-983 - Controls and displays can cause or be jeopardized by computer system malfunction during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-984 - Controls and displays can cause or be jeopardized by computer system malfunction during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-986 - Controls and displays can cause or be jeopardized by operator error during manufacture and fabrication of subsystems and components. -- The probability of operator error will be related to difficulty in reading or interpreting displays. At the present time, this hazard cannot be properly evaluated, owing to the diversity of manufacturing tools and test equipment. However, this hazard is present in varying degrees in every case where a control must be operated or a display must be interpreted on a tool, test instrument, or readout device. (6 20 88)

LRB-P-Y-987 - Controls and displays can cause or be jeopardized by operator error during inspection and test of the LRB and subsystems. -- See comments for Y-986. (6 20 88)

LRB-P-Y-988 - Controls and displays can cause or be jeopardized by operator error during proof test of pressure vessels and structure. -- See comments for Y-986. (6 20 88)

LRB-P-Y-989 - Controls and displays can cause or be jeopardized by operator error during acceptance test and checkout prior to delivery to the Government. -- See comments for Y-986. (6 20 88)

LRB-P-Y-990 - Controls and displays can cause or be jeopardized by operator error during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-991 - Controls and displays can cause or be jeopardized by operator error during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-992 - Controls and displays can cause or be jeopardized by operator error during preparation for shipment of the booster and ship loose hardware. -- See comments for Y-986. (6 20 88)

LRB-P-Y-993 - Controls and displays can cause or be jeopardized by operator error during transportation from manufacture to launch site or after recovery. -- See comments for Y-986. (6 20 88)

LRB-P-Y-994 - Controls and displays can cause or be jeopardized by operator error during storage, including storage of major components. -- See comments for Y-986. (6 20 88)

LRB-P-Y-995 - Controls and displays can cause or be jeopardized by operator error during preflight checkout prior to stacking. -- See comments for Y-986. (6 20 88)

LRB-P-Y-996 - Controls and displays can cause or be jeopardized by operator error during vehicle stacking, including ancillary test activities. -- See comments for Y-986. (6 20 88)

LRB-P-Y-997 - Controls and displays can cause or be jeopardized by operator error during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-998 - Controls and displays can cause or be jeopardized by operator error during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-999 - Controls and displays can cause or be jeopardized by operator error during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-1000 - Controls and displays can cause or be jeopardized by operator error during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-1001 - Controls and displays can cause or be jeopardized by operator error during nominal flight from liftoff to LRB burnout. -- This hazard is analyzed as C-570. (6 20 88)

LRB-P-Y-1002 - Controls and displays can cause or be jeopardized by operator error during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is analyzed as C-570. (6 20 88)

LRB-P-Y-1003 - Controls and displays can cause or be jeopardized by operator error during separation of the LRB from the STS vehicle. -- This hazard is analyzed as C-570. (6 20 88)

LRB-P-Y-1007 - Controls and displays can cause or be jeopardized by operator error during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-1008 - Controls and displays can cause or be jeopardized by operator error during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-1034 - Controls and displays can cause or be jeopardized by emergencies during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-1035 - Controls and displays can cause or be jeopardized by emergencies during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-1036 - Controls and displays can cause or be jeopardized by emergencies during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-1037 - Controls and displays can cause or be jeopardized by emergencies during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-1038 - Controls and displays can cause or be jeopardized by emergencies during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-1039 - Controls and displays can cause or be jeopardized by emergencies during flight readiness ing (FRF) of the STS vehicle. -- At the current state of

maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-1040 - Controls and displays can cause or be jeopardized by emergencies during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-1041 - Controls and displays can cause or be jeopardized by emergencies during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-1042 - Controls and displays can cause or be jeopardized by emergencies during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-1043 - Controls and displays can cause or be jeopardized by emergencies during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-1044 - Controls and displays can cause or be jeopardized by emergencies during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-1045 - Controls and displays can cause or be jeopardized by emergencies during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-1046 - Controls and displays can cause or be jeopardized by emergencies during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-1047 - Controls and displays can cause or be jeopardized by emergencies during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-1048 - Controls and displays can cause or be jeopardized by emergencies during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-1049 - Controls and displays can cause or be jeopardized by emergencies during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-1050 - Controls and displays can cause or be jeopardized by emergencies during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-1051 - Controls and displays can cause or be jeopardized by emergencies during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-1054 - Controls and displays can cause or be jeopardized by emergencies during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Y-1055 - Controls and displays can cause or be jeopardized by emergencies during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

THESE HAZARDS WERE CONSIDERED BY THE ANALYST BUT WERE NOT FURTHER ANALYZED FOR THE REASONS GIVEN

LRB-P-Z-530 - Caution and warning systems can cause or be jeopardized by hazardous environments during manufacture and fabrication of subsystems and components. -- During manufacture, caution and warning systems would be those employed to prevent industrial accidents, such as fire alarms, smoke alarms, etc. At present, it is not possible to determine what types of alarms might be needed. This appears to be an industrial safety issue which sould be addressed after the various manufacturing processes have been identified. (6 20 88)

LRB-P-Z-531 - Caution and warning systems can cause or be jeopardized by hazardous environments during inspection and test of the LRB and subsystems. -- At this time, it is not possible to determine all of the hazardous environments for which caution and warning requirements might exist. (6 20 88)

LRB-P-Z-532 - Caution and warning systems can cause or be jeopardized by hazardous environments during proof test of pressure vessels and structure. -- Some means of preventing unauthorized personnel near the proof test facility during testing should be provided, and physical barriers should be installed to prevent inadvertent entry. A fence with a guarded gate appears to be adequate. (6 20 88)

LRB-P-Z-533 - Caution and warning systems can cause or be jeopardized by hazardous environments during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-534 - Caution and warning systems can cause or be jeopardized by hazardous environments during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-535 - Caution and warning systems can cause or be jeopardized by hazardous environments during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-536 - Caution and warning systems can cause or be jeopardized by hazardous environments during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-537 - Caution and warning systems can cause or be jeopardized by hazardous environments during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-538 - Caution and warning systems can cause or be jeopardized by

hazardous environments during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-539 - Caution and warning systems can cause or be jeopardized by hazardous environments during preflight checkout prior to stacking. -- It is not clear at this time what hazardous environments might exist prior to fueling. (6 20 88)

LRB-P-Z-540 - Caution and warning systems can cause or be jeopardized by hazardous environments during vehicle stacking, including ancillary test activities. -- It is not clear at this time what hazardous environments might exist prior to fueling. (6 20 88)

LRB-P-Z-541 - Caution and warning systems can cause or be jeopardized by hazardous environments during rollout from the VAB and preloading preparation. -- It is not clear at this time what hazardous environments might exist prior to fueling. (6 20 88)

LRB-P-Z-542 - Caution and warning systems can cause or be jeopardized by hazardous environments during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-543 - Caution and warning systems can cause or be jeopardized by hazardous environments during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-544 - Caution and warning systems can cause or be jeopardized by hazardous environments during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-545 - Caution and warning systems can cause or be jeopardized by hazardous environments during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-547 - Caution and warning systems can cause or be jeopardized by hazardous environments during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-548 - Caution and warning systems can cause or be jeopardized by hazardous environments during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-549 - Caution and warning systems can cause or be jeopardized by hazardous environments during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-550 - Caution and warning systems can cause or be jeopardized by hazardous environments during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-551 - Caution and warning systems can cause or be jeopardized by hazardous environments during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-552 - Caution and warning systems can cause or be jeopardized by hazardous environments during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-554 - Caution and warning systems can cause or be jeopardized by worker overload during manufacture and fabrication of subsystems and components. -- This appears to be a generic industrial safety problem, not specifically related to the LRB. (6 20 88)

LRB-P-Z-555 - Caution and warning systems can cause or be jeopardized by worker overload during inspection and test of the LRB and subsystems. -- This appears to be a generic industrial safety problem, not specifically related to the LRB. (6 20 88)

LRB-P-Z-556 - Caution and warning systems can cause or be jeopardized by worker overload during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-557 - Caution and warning systems can cause or be jeopardized by worker overload during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-558 - Caution and warning systems can cause or be jeopardized by worker overload during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-559 - Caution and warning systems can cause or be jeopardized by worker overload during flight readiness firing (FRF) of the STS vehicle. -- This hazard is related to F-559. (6 20 88)

LRB-P-Z-560 - Caution and warning systems can cause or be jeopardized by worker overload during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-561 - Caution and warning systems can cause or be jeopardized by worker overload during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-562 - Caution and warning systems can cause or be jeopardized by worker overload during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-563 - Caution and warning systems can cause or be jeopardized by worker overload during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-564 - Caution and warning systems can cause or be jeopardized by worker overload during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-565 - Caution and warning systems can cause or be jeopardized by worker overload during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-566 - Caution and warning systems can cause or be jeopardized by worker overload during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-567 - Caution and warning systems can cause or be jeopardized by worker overload during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-568 - Caution and warning systems can cause or be jeopardized by worker overload during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-574 - Caution and warning systems can cause or be jeopardized by worker overload during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-575 - Caution and warning systems can cause or be jeopardized by worker overload during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-576 - Caution and warning systems can cause or be jeopardized by worker overload during refurbishment of reusable components. -- This appears to be a generic industrial safety problem, not specifically related to the LRB. (6 20 88)

LRB-P-Z-578 - Caution and warning systems can cause or be jeopardized by unsafe or unhygienic working conditions during manufacture and fabrication of subsystems and components. -- This appears to be a generic industrial safety problem, not specifically related to the LRB. (6 20 88)

LRB-P-Z-579 - Caution and warning systems can cause or be jeopardized by unsafe

or unhygienic working conditions during inspection and test of the LRB and subsystems. -- This appears to be a generic industrial safety problem, not specifically related to the LRB. (6 20 88)

LRB-P-Z-580 - Caution and warning systems can cause or be jeopardized by unsafe or unhygienic working conditions during proof test of pressure vessels and structure. -- This appears to be a generic industrial safety problem, not specifically related to the LRB. (6 20 88)

LRB-P-Z-581 - Caution and warning systems can cause or be jeopardized by unsafe or unhygienic working conditions during acceptance test and checkout prior to delivery to the Government. -- This appears to be a generic industrial safety problem, not specifically related to the LRB. (6 20 88)

LRB-P-Z-582 - Caution and warning systems can cause or be jeopardized by unsafe or unhygienic working conditions during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-583 - Caution and warning systems can cause or be jeopardized by unsafe or unhygienic working conditions during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-584 - Caution and warning systems can cause or be jeopardized by unsafe or unhygienic working conditions during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-585 - Caution and warning systems can cause or be jeopardized by unsafe or unhygienic working conditions during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-586 - Caution and warning systems can cause or be jeopardized by unsafe or unhygienic working conditions during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-587 - Caution and warning systems can cause or be jeopardized by unsafe or unhygienic working conditions during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-588 - Caution and warning systems can cause or be jeopardized by unsafe or unhygienic working conditions during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-589 - Caution and warning systems can cause or be jeopardized by unsafe or unhygienic working conditions during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-590 - Caution and warning systems can cause or be jeopardized by unsafe or unhygienic working conditions during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-591 - Caution and warning systems can cause or be jeopardized by unsafe or unhygienic working conditions during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-592 - Caution and warning systems can cause or be jeopardized by unsafe or unhygienic working conditions during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-598 - Caution and warning systems can cause or be jeopardized by unsafe or unhygienic working conditions during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-599 - Caution and warning systems can cause or be jeopardized by unsafe or unhygienic working conditions during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-600 - Caution and warning systems can cause or be jeopardized by unsafe or unhygienic working conditions during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-633 - Caution and warning systems can cause or be jeopardized by wind during transportation from manufacture to launch site or after recovery. -- The LRB will be less jeopardized by wind than the ET, which is safety transported between manufacturing facilities as well as from the manufacturing facility to the launch complex. Experience has shown that the ET can be moved safely using weather predictions which are readily available from the National Weather Service. Therefore, this hazard does not appear to be credible. (6 20 88)

LRB-P-Z-637 - Caution and warning systems can cause or be jeopardized by wind during rollout from the VAB and preloading preparation. -- This hazard is not credible. (6 20 88)

LRB-P-Z-638 - Caution and warning systems can cause or be jeopardized by wind during propellant loading for test or flight. -- This hazard is not credible. (6 20 88)

LRB-P-Z-639 - Caution and warning systems can cause or be jeopardized by wind during countdown to liftoff or abort. -- This hazard is not credible. (6 20 88)

LRB-P-Z-640 - Caution and warning systems can cause or be jeopardized by wind during launch abort activities, including mission postponement (scrub). -- This hazard is not credible. (6 20 88)

LRB-P-Z-641 - Caution and warning systems can cause or be jeopardized by wind during nominal flight from liftoff to LRB burnout. -- The increased vector control authority of the LRB should minimize the effect of wind on the STS flight trajectory. (6 20 88)

LRB-P-Z-642 - Caution and warning systems can cause or be jeopardized by wind during intact abort, including RTLS, TAL, AOA and ATO. -- Current procedures for weather prediction appear to be adequate. In addition, the increased number of options available with the LRB will minimize the probability of a requirement to land in bad weather. (6 20 88)

LRB-P-Z-643 - Caution and warning systems can cause or be jeopardized by wind during separation of the LRB from the STS vehicle. -- This hazard is not credible. (6 20 88)

LRB-P-Z-644 - Caution and warning systems can cause or be jeopardized by wind during descent from separation to ocean impact. -- This is not a problem with expendable boosters, and does not appear to be significantly different from similar concerns with the SRB, which have been successfully resolved. (6 20 88)

LRB-P-Z-645 - Caution and warning systems can cause or be jeopardized by wind during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-646 - Caution and warning systems can cause or be jeopardized by wind during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-647 - Caution and warning systems can cause or be jeopardized by wind during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-648 - Caution and warning systems can cause or be jeopardized by wind during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (6 20 88)

LRB-P-Z-678 - Caution and warning systems can cause or be jeopardized by heat sources during test firing of engines and/or the completed booster. -- This hazard is not credible. (6 20 88)

LRB-P-Z-679 - Caution and warning systems can cause or be jeopardized by heat sources during flight readiness firing (FRF) of the STS vehicle. -- This hazard is not credible. (6 20 88)

LRB-P-Z-681 - Caution and warning systems can cause or be jeopardized by heat sources during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (6 20 88)

LRB-P-Z-682 - Caution and warning systems can cause or be jeopardized by heat sources during storage, including storage of major components. -- This hazard is not credible. (6 20 88)

LRB-P-Z-685 - Caution and warning systems can cause or be jeopardized by heat sources during rollout from the VAB and preloading preparation. -- This hazard is not credible. (6 20 88)

LRB-P-Z-686 - Caution and warning systems can cause or be jeopardized by heat sources during propellant loading for test or flight. -- This hazard is not credible. (6 20 88)

LRB-P-Z-687 - Caution and warning systems can cause or be jeopardized by heat sources during countdown to liftoff or abort. -- This hazard is not credible. (6 20 88)

LRB-P-Z-688 - Caution and warning systems can cause or be jeopardized by heat sources during launch abort activities, including mission postponement (scrub). -- This hazard is not credible. (6 20 88)

LRB-P-Z-689 - Caution and warning systems can cause or be jeopardized by heat sources during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (6 20 88)

LRB-P-Z-690 - Caution and warning systems can cause or be jeopardized by heat sources during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (6 20 88)

LRB-P-Z-691 - Caution and warning systems can cause or be jeopardized by heat sources during separation of the LRB from the STS vehicle. -- This hazard is not credible. (6 20 88)

LRB-P-Z-692 - Caution and warning systems can cause or be jeopardized by heat sources during descent from separation to ocean impact. -- This hazard is not credible. (6 20 88)

LRB-P-Z-724 - Caution and warning systems can cause or be jeopardized by moisture or precipitation during proof test of pressure vessels and structure. -- This hazard is not credible. (6 21 88)

LRB-P-Z-726 - Caution and warning systems can cause or be jeopardized by moisture or precipitation during test firing of engines and/or the completed booster. -- It is assumed that test firing will not take place in inclement weather. (6 21 88)

LRB-P-Z-727 - Caution and warning systems can cause or be jeopardized by moisture or precipitation during flight readiness firing (FRF) of the STS vehicle. -- It is assumed that test firing will not take place in inclement weather. (6 21 88)

LRB-P-Z-729 - Caution and warning systems can cause or be jeopardized by moisture or precipitation during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-730 - Caution and warning systems can cause or be jeopardized by moisture or precipitation during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-731 - Caution and warning systems can cause or be jeopardized by moisture or precipitation during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-732 - Caution and warning systems can cause or be jeopardized by moisture or precipitation during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-733 - Caution and warning systems can cause or be jeopardized by moisture or precipitation during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-734 - Caution and warning systems can cause or be jeopardized by moisture or precipitation during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-735 - Caution and warning systems can cause or be jeopardized by moisture or precipitation during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-736 - Caution and warning systems can cause or be jeopardized by moisture or precipitation during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-737 - Caution and warning systems can cause or be jeopardized by moisture or precipitation during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-738 - Caution and warning systems can cause or be jeopardized by moisture or precipitation during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-739 - Caution and warning systems can cause or be jeopardized by moisture or precipitation during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-740 - Caution and warning systems can cause or be jeopardized by moisture or precipitation during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-741 - Caution and warning systems can cause or be jeopardized by moisture or precipitation during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-742 - Caution and warning systems can cause or be jeopardized by moisture or precipitation during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (6 21 88)

LRB-P-Z-743 - Caution and warning systems can cause or be jeopardized by moisture or precipitation during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (6 21 88)

LRB-P-Z-744 - Caution and warning systems can cause or be jeopardized by moisture or precipitation during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-746 - Caution and warning systems can cause or be jeopardized by electrical system malfunction during manufacture and fabrication of subsystems and components. -- This appears to be a generic industrial safety hazard, not specifically related to the LRB. (6 21 88)

LRB-P-Z-747 - Caution and warning systems can cause or be jeopardized by electrical system malfunction during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-749 - Caution and warning systems can cause or be jeopardized by electrical system malfunction during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-751 - Caution and warning systems can cause or be jeopardized by electrical system malfunction during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as Z-750. (6 21 88)

LRB-P-Z-752 - Caution and warning systems can cause or be jeopardized by electrical system malfunction during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-753 - Caution and warning systems can cause or be jeopardized by electrical system malfunction during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-754 - Caution and warning systems can cause or be jeopardized by electrical system malfunction during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-755 - Caution and warning systems can cause or be jeopardized by electrical system malfunction during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-756 - Caution and warning systems can cause or be jeopardized by electrical system malfunction during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-757 - Caution and warning systems can cause or be jeopardized by electrical system malfunction during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-758 - Caution and warning systems can cause or be jeopardized by electrical system malfunction during propellant loading for test or flight. -- It is assumed that ullage pressure and other potentially hazardous energy sources will be capable of being managed without active electrical systems. (6 21 88)

LRB-P-Z-759 - Caution and warning systems can cause or be jeopardized by electrical system malfunction during countdown to liftoff or abort. -- It is assumed that electrical failure will be cause for a launch abort. (6 21 88)

LRB-P-Z-760 - Caution and warning systems can cause or be jeopardized by electrical system malfunction during launch abort activities, including mission postponement (scrub). -- It is assumed that procedures will be available to safe the vehicle in the event of a power failure. However, see hazard analysis for Y-568. (6 21 88)

LRB-P-Z-761 - Caution and warning systems can cause or be jeopardized by electrical system malfunction during nominal flight from liftoff to LRB burnout. -- Any electrical failure can be considered catastrophic in flight. It is therefore assumed that all critical systems will be provided with redundant power supplies. (6 21 88)

LRB-P-Z-762 - Caution and warning systems can cause or be jeopardized by electrical system malfunction during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-763 - Caution and warning systems can cause or be jeopardized by electrical system malfunction during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-764 - Caution and warning systems can cause or be jeopardized by electrical system malfunction during descent from separation to ocean impact. -- This hazard is not credible. (6 21 88)

LRB-P-Z-765 - Caution and warning systems can cause or be jeopardized by electrical system malfunction during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (6 21 88)

LRB-P-Z-766 - Caution and warning systems can cause or be jeopardized by electrical system malfunction during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (6 21 88)

LRB-P-Z-767 - Caution and warning systems can cause or be jeopardized by electrical system malfunction during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-768 - Caution and warning systems can cause or be jeopardized by electrical system malfunction during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-772 - Caution and warning systems can cause or be jeopardized by differential pressure during proof test of pressure vessels and structure. -- This hazard is analyzed as Z-748. (6 21 88)

LRB-P-Z-774 - Caution and warning systems can cause or be jeopardized by differential pressure during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-775 - Caution and warning systems can cause or be jeopardized by differential pressure during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-777 - Caution and warning systems can cause or be jeopardized by differential pressure during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-778 - Caution and warning systems can cause or be jeopardized by differential pressure during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-782 - Caution and warning systems can cause or be jeopardized by differential pressure during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-783 - Caution and warning systems can cause or be jeopardized by differential pressure during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-784 - Caution and warning systems can cause or be jeopardized by differential pressure during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-785 - Caution and warning systems can cause or be jeopardized by differential pressure during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-786 - Caution and warning systems can cause or be jeopardized by differential pressure during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-787 - Caution and warning systems can cause or be jeopardized by differential pressure during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-788 - Caution and warning systems can cause or be jeopardized by differential pressure during descent from separation to ocean impact. -- This hazard is not credible. (6 21 88)

LRB-P-Z-789 - Caution and warning systems can cause or be jeopardized by differential pressure during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (6 21 88)

LRB-P-Z-790 - Caution and warning systems can cause or be jeopardized by differential pressure during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (6 21 88)

LRB-P-Z-791 - Caution and warning systems can cause or be jeopardized by differential pressure during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-798 - Caution and warning systems can cause or be jeopardized by

vibration, acoustic loads or shock during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-799 - Caution and warning systems can cause or be jeopardized by vibration, acoustic loads or shock during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-801 - Caution and warning systems can cause or be jeopardized by vibration, acoustic loads or shock during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-808 - Caution and warning systems can cause or be jeopardized by vibration, acoustic loads or shock during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-809 - Caution and warning systems can cause or be jeopardized by vibration, acoustic loads or shock during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-810 - Caution and warning systems can cause or be jeopardized by vibration, acoustic loads or shock during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-811 - Caution and warning systems can cause or be jeopardized by vibration, acoustic loads or shock during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-812 - Caution and warning systems can cause or be jeopardized by vibration, acoustic loads or shock during descent from separation to ocean impact. -- This hazard is not credible. (6 21 88)

LRB-P-Z-813 - Caution and warning systems can cause or be jeopardized by vibration, acoustic loads or shock during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (6 21 88)

LRB-P-Z-815 - Caution and warning systems can cause or be jeopardized by vibration, acoustic loads or shock during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (6 21 88)

LRB-P-Z-820 - Caution and warning systems can cause or be jeopardized by structural loads during proof test of pressure vessels and structure. -- This hazard is analyzed as Z-748. (6 21 88)

LRB-P-Z-822 - Caution and warning systems can cause or be jeopardized by

structural loads during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-823 - Caution and warning systems can cause or be jeopardized by structural loads during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-825 - Caution and warning systems can cause or be jeopardized by structural loads during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-828 - Caution and warning systems can cause or be jeopardized by structural loads during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-829 - Caution and warning systems can cause or be jeopardized by structural loads during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-830 - Caution and warning systems can cause or be jeopardized by structural loads during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-831 - Caution and warning systems can cause or be jeopardized by structural loads during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-832 - Caution and warning systems can cause or be jeopardized by structural loads during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-833 - Caution and warning systems can cause or be jeopardized by structural loads during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-834 - Caution and warning systems can cause or be jeopardized by structural loads during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-835 - Caution and warning systems can cause or be jeopardized by structural loads during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-836 - Caution and warning systems can cause or be jeopardized by structural loads during descent from separation to ocean impact. -- At the current

state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-837 - Caution and warning systems can cause or be jeopardized by structural loads during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-838 - Caution and warning systems can cause or be jeopardized by structural loads during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-839 - Caution and warning systems can cause or be jeopardized by structural loads during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-843 - Caution and warning systems can cause or be jeopardized by leaks during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-844 - Caution and warning systems can cause or be jeopardized by leaks during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-845 - Caution and warning systems can cause or be jeopardized by leaks during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-846 - Caution and warning systems can cause or be jeopardized by leaks during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-847 - Caution and warning systems can cause or be jeopardized by leaks during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-849 - Caution and warning systems can cause or be jeopardized by leaks during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-850 - Caution and warning systems can cause or be jeopardized by leaks during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-851 - Caution and warning systems can cause or be jeopardized by leaks during preflight checkout prior to stacking. -- At the current state of maturity, this

hazard cannot be evaluated. (6 21 88)

LRB-P-Z-852 - Caution and warning systems can cause or be jeopardized by leaks during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-853 - Caution and warning systems can cause or be jeopardized by leaks during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-854 - Caution and warning systems can cause or be jeopardized by leaks during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-855 - Caution and warning systems can cause or be jeopardized by leaks during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-856 - Caution and warning systems can cause or be jeopardized by leaks during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-857 - Caution and warning systems can cause or be jeopardized by leaks during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-858 - Caution and warning systems can cause or be jeopardized by leaks during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-859 - Caution and warning systems can cause or be jeopardized by leaks during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-860 - Caution and warning systems can cause or be jeopardized by leaks during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-861 - Caution and warning systems can cause or be jeopardized by leaks during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-862 - Caution and warning systems can cause or be jeopardized by leaks during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-863 - Caution and warning systems can cause or be jeopardized by leaks during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-864 - Caution and warning systems can cause or be jeopardized by leaks during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-870 - Caution and warning systems can cause or be jeopardized by propellant characteristics and products during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-871 - Caution and warning systems can cause or be jeopardized by propellant characteristics and products during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-873 - Caution and warning systems can cause or be jeopardized by propellant characteristics and products during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-874 - Caution and warning systems can cause or be jeopardized by propellant characteristics and products during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-877 - Caution and warning systems can cause or be jeopardized by propellant characteristics and products during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-878 - Caution and warning systems can cause or be jeopardized by propellant characteristics and products during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-879 - Caution and warning systems can cause or be jeopardized by propellant characteristics and products during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-880 - Caution and warning systems can cause or be jeopardized by propellant characteristics and products during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-881 - Caution and warning systems can cause or be jeopardized by

propellant characteristics and products during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-882 - Caution and warning systems can cause or be jeopardized by propellant characteristics and products during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-883 - Caution and warning systems can cause or be jeopardized by propellant characteristics and products during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-884 - Caution and warning systems can cause or be jeopardized by propellant characteristics and products during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-885 - Caution and warning systems can cause or be jeopardized by propellant characteristics and products during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-886 - Caution and warning systems can cause or be jeopardized by propellant characteristics and products during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-887 - Caution and warning systems can cause or be jeopardized by propellant characteristics and products during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-888 - Caution and warning systems can cause or be jeopardized by propellant characteristics and products during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-895 - Caution and warning systems can cause or be jeopardized by lightning or electromagnetic discharge during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as Z-894. (6 21 88)

LRB-P-Z-897 - Caution and warning systems can cause or be jeopardized by lightning or electromagnetic discharge during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-898 - Caution and warning systems can cause or be jeopardized by

lightning or electromagnetic discharge during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-901 - Caution and warning systems can cause or be jeopardized by lightning or electromagnetic discharge during rollout from the VAB and preloading preparation. -- This hazard is analyzed as Z-894. (6 21 88)

LRB-P-Z-902 - Caution and warning systems can cause or be jeopardized by lightning or electromagnetic discharge during propellant loading for test or flight. -- This hazard is analyzed as Z-894. (6 21 88)

LRB-P-Z-903 - Caution and warning systems can cause or be jeopardized by lightning or electromagnetic discharge during countdown to liftoff or abort. -- This hazard is analyzed as Z-894. (6 21 88)

LRB-P-Z-904 - Caution and warning systems can cause or be jeopardized by lightning or electromagnetic discharge during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as Z-894. (6 21 88)

LRB-P-Z-905 - Caution and warning systems can cause or be jeopardized by lightning or electromagnetic discharge during nominal flight from liftoff to LRB burnout. -- This hazard is analyzed as Z-894. (6 21 88)

LRB-P-Z-906 - Caution and warning systems can cause or be jeopardized by lightning or electromagnetic discharge during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is analyzed as Z-894. (6 21 88)

LRB-P-Z-907 - Caution and warning systems can cause or be jeopardized by lightning or electromagnetic discharge during separation of the LRB from the STS vehicle. -- This hazard is analyzed as Z-894. (6 21 88)

LRB-P-Z-908 - Caution and warning systems can cause or be jeopardized by lightning or electromagnetic discharge during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-909 - Caution and warning systems can cause or be jeopardized by lightning or electromagnetic discharge during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-910 - Caution and warning systems can cause or be jeopardized by lightning or electromagnetic discharge during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-911 - Caution and warning systems can cause or be jeopardized by lightning or electromagnetic discharge during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-913 - Caution and warning systems can cause or be jeopardized by faulty documentation during component or material purchase, including acquisition of GFP. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-914 - Caution and warning systems can cause or be jeopardized by faulty documentation during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-915 - Caution and warning systems can cause or be jeopardized by faulty documentation during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-916 - Caution and warning systems can cause or be jeopardized by faulty documentation during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-917 - Caution and warning systems can cause or be jeopardized by faulty documentation during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-918 - Caution and warning systems can cause or be jeopardized by faulty documentation during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-919 - Caution and warning systems can cause or be jeopardized by faulty documentation during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-920 - Caution and warning systems can cause or be jeopardized by faulty documentation during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-921 - Caution and warning systems can cause or be jeopardized by faulty documentation during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-922 - Caution and warning systems can cause or be jeopardized by faulty documentation during storage, including storage of major components. -- At the

current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-923 - Caution and warning systems can cause or be jeopardized by faulty documentation during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-924 - Caution and warning systems can cause or be jeopardized by faulty documentation during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-925 - Caution and warning systems can cause or be jeopardized by faulty documentation during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-926 - Caution and warning systems can cause or be jeopardized by faulty documentation during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-927 - Caution and warning systems can cause or be jeopardized by faulty documentation during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-928 - Caution and warning systems can cause or be jeopardized by faulty documentation during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-929 - Caution and warning systems can cause or be jeopardized by faulty documentation during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-930 - Caution and warning systems can cause or be jeopardized by faulty documentation during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-931 - Caution and warning systems can cause or be jeopardized by faulty documentation during separation of the LRB from the STS vehicle. -- This hazard is not credible. (6 21 88)

LRB-P-Z-935 - Caution and warning systems can cause or be jeopardized by faulty documentation during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-936 - Caution and warning systems can cause or be jeopardized by faulty documentation during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-938 - Caution and warning systems can cause or be jeopardized by chemical activity during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-939 - Caution and warning systems can cause or be jeopardized by chemical activity during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-940 - Caution and warning systems can cause or be jeopardized by chemical activity during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-941 - Caution and warning systems can cause or be jeopardized by chemical activity during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-942 - Caution and warning systems can cause or be jeopardized by chemical activity during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-943 - Caution and warning systems can cause or be jeopardized by chemical activity during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-944 - Caution and warning systems can cause or be jeopardized by chemical activity during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-945 - Caution and warning systems can cause or be jeopardized by chemical activity during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-946 - Caution and warning systems can cause or be jeopardized by chemical activity during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-947 - Caution and warning systems can cause or be jeopardized by chemical activity during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-948 - Caution and warning systems can cause or be jeopardized by chemical activity during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-949 - Caution and warning systems can cause or be jeopardized by chemical activity during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-950 - Caution and warning systems can cause or be jeopardized by chemical activity during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-951 - Caution and warning systems can cause or be jeopardized by chemical activity during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-952 - Caution and warning systems can cause or be jeopardized by chemical activity during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-953 - Caution and warning systems can cause or be jeopardized by chemical activity during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-954 - Caution and warning systems can cause or be jeopardized by chemical activity during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-955 - Caution and warning systems can cause or be jeopardized by chemical activity during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-956 - Caution and warning systems can cause or be jeopardized by chemical activity during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-957 - Caution and warning systems can cause or be jeopardized by chemical activity during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-958 - Caution and warning systems can cause or be jeopardized by chemical activity during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-959 - Caution and warning systems can cause or be jeopardized by chemical activity during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-960 - Caution and warning systems can cause or be jeopardized by chemical activity during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-962 - Caution and warning systems can cause or be jeopardized by computer system malfunction during manufacture and fabrication of subsystems and components. -- This hazard is analyzed as V-746. (6 21 88)

LRB-P-Z-963 - Caution and warning systems can cause or be jeopardized by computer system malfunction during inspection and test of the LRB and subsystems. -- This hazard is analyzed as E-963. (6 21 88)

LRB-P-Z-964 - Caution and warning systems can cause or be jeopardized by computer system malfunction during proof test of pressure vessels and structure. -- This hazard is analyzed as G-748. (6 21 88)

LRB-P-Z-965 - Caution and warning systems can cause or be jeopardized by computer system malfunction during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-966 - Caution and warning systems can cause or be jeopardized by computer system malfunction during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-967 - Caution and warning systems can cause or be jeopardized by computer system malfunction during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as E-967. (6 21 88)

LRB-P-Z-969 - Caution and warning systems can cause or be jeopardized by computer system malfunction during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-970 - Caution and warning systems can cause or be jeopardized by computer system malfunction during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-971 - Caution and warning systems can cause or be jeopardized by computer system malfunction during preflight checkout prior to stacking. -- This hazard is analyzed as E-967. (6 21 88)

LRB-P-Z-972 - Caution and warning systems can cause or be jeopardized by computer system malfunction during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-973 - Caution and warning systems can cause or be jeopardized by computer system malfunction during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-974 - Caution and warning systems can cause or be jeopardized by computer system malfunction during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-975 - Caution and warning systems can cause or be jeopardized by computer system malfunction during countdown to liftoff or abort. -- This hazard is analyzed as E-977. (6 21 88)

LRB-P-Z-976 - Caution and warning systems can cause or be jeopardized by computer system malfunction during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as E-967. (6 21 88)

LRB-P-Z-977 - Caution and warning systems can cause or be jeopardized by computer system malfunction during nominal flight from liftoff to LRB burnout. -- This hazard is analyzed as E-977. (6 21 88)

LRB-P-Z-978 - Caution and warning systems can cause or be jeopardized by computer system malfunction during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is analyzed as E-977, (6 21 88)

LRB-P-Z-979 - Caution and warning systems can cause or be jeopardized by computer system malfunction during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-980 - Caution and warning systems can cause or be jeopardized by computer system malfunction during descent from separation to ocean impact. -- This hazard is not credible. (6 21 88)

LRB-P-Z-981 - Caution and warning systems can cause or be jeopardized by computer system malfunction during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (6 21 88)

LRB-P-Z-982 - Caution and warning systems can cause or be jeopardized by computer system malfunction during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (6 21 88)

LRB-P-Z-983 - Caution and warning systems can cause or be jeopardized by computer system malfunction during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (6 21 88)

LRB-P-Z-984 - Caution and warning systems can cause or be jeopardized by

computer system malfunction during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-986 - Caution and warning systems can cause or be jeopardized by operator error during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-987 - Caution and warning systems can cause or be jeopardized by operator error during inspection and test of the LRB and subsystems. -- This hazard is analyzed as X-987. (6 21 88)

LRB-P-Z-988 - Caution and warning systems can cause or be jeopardized by operator error during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-989 - Caution and warning systems can cause or be jeopardized by operator error during acceptance test and checkout prior to delivery to the Government. -- This hazard is analyzed as X-987. (6 21 88)

LRB-P-Z-990 - Caution and warning systems can cause or be jeopardized by operator error during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-991 - Caution and warning systems can cause or be jeopardized by operator error during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-992 - Caution and warning systems can cause or be jeopardized by operator error during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-993 - Caution and warning systems can cause or be jeopardized by operator error during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-994 - Caution and warning systems can cause or be jeopardized by operator error during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-995 - Caution and warning systems can cause or be jeopardized by operator error during preflight checkout prior to stacking. -- This hazard is analyzed as X-987. (6 21 88)

LRB-P-Z-996 - Caution and warning systems can cause or be jeopardized by operator error during vehicle stacking, including ancillary test activities. -- This

hazard is analyzed as X-987. (6 21 88)

LRB-P-Z-997 - Caution and warning systems can cause or be jeopardized by operator error during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-998 - Caution and warning systems can cause or be jeopardized by operator error during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-999 - Caution and warning systems can cause or be jeopardized by operator error during countdown to liftoff or abort. -- This hazard is analyzed as X-991. (6 21 88)

LRB-P-Z-1000 - Caution and warning systems can cause or be jeopardized by operator error during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as X-991. (6 21 88)

LRB-P-Z-1001 - Caution and warning systems can cause or be jeopardized by operator error during nominal flight from liftoff to LRB burnout. -- This hazard is analyzed as C-1001. (6 21 88)

LRB-P-Z-1002 - Caution and warning systems can cause or be jeopardized by operator error during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is analyzed as C-1001. (6 21 88)

LRB-P-Z-1003 - Caution and warning systems can cause or be jeopardized by operator error during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-1007 - Caution and warning systems can cause or be jeopardized by operator error during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-1008 - Caution and warning systems can cause or be jeopardized by operator error during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-1034 - Caution and warning systems can cause or be jeopardized by emergencies during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-1035 - Caution and warning systems can cause or be jeopardized by emergencies during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-1036 - Caution and warning systems can cause or be jeopardized by emergencies during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-1037 - Caution and warning systems can cause or be jeopardized by emergencies during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-1038 - Caution and warning systems can cause or be jeopardized by emergencies during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-1039 - Caution and warning systems can cause or be jeopardized by emergencies during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-1040 - Caution and warning systems can cause or be jeopardized by emergencies during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-1041 - Caution and warning systems can cause or be jeopardized by emergencies during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-1042 - Caution and warning systems can cause or be jeopardized by emergencies during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-1043 - Caution and warning systems can cause or be jeopardized by emergencies during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-1044 - Caution and warning systems can cause or be jeopardized by emergencies during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-1045 - Caution and warning systems can cause or be jeopardized by emergencies during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-1046 - Caution and warning systems can cause or be jeopardized by emergencies during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-1047 - Caution and warning systems can cause or be jeopardized by emergencies during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-1048 - Caution and warning systems can cause or be jeopardized by emergencies during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-1049 - Caution and warning systems can cause or be jeopardized by emergencies during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-1050 - Caution and warning systems can cause or be jeopardized by emergencies during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is analyzed as Z-546. (6 21 88)

LRB-P-Z-1051 - Caution and warning systems can cause or be jeopardized by emergencies during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

LRB-P-Z-1052 - Caution and warning systems can cause or be jeopardized by emergencies during descent from separation to ocean impact. -- This hazard is not credible. (6 21 88)

LRB-P-Z-1053 - Caution and warning systems can cause or be jeopardized by emergencies during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (6 21 88)

LRB-P-Z-1054 - Caution and warning systems can cause or be jeopardized by emergencies during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (6 21 88)

LRB-P-Z-1055 - Caution and warning systems can cause or be jeopardized by emergencies during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (6 21 88)

LRB-P-Z-1056 - Caution and warning systems can cause or be jeopardized by emergencies during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (6 21 88)

THESE HAZARDS WERE EXCLUDED BY PHAROS BECAUSE THEY WERE ON ONE OR MORE OF THE EXCLUSION MATRICES AS SHOWN BELOW

LRB avionics can cause or be jeopardized by hazardous environments (Number 1 on MATRIX 1) (3 11 88).

The hazard of hazardous environments can be experienced during component or material purchase, including acquisition of GFP (Number 1197 on MATRIX 3) (3 11 88).

LRB avionics can cause hazards or be jeopardized during proof test of pressure vessels and structure (Number 651 on MATRIX 2) (3 11 88).

LRB avionics can cause or be jeopardized by worker overload (Number 2 on MATRIX 1) (3 11 88).

The hazard of worker overload can be experienced during component or material purchase, including acquisition of GFP (Number 1198 on MATRIX 3) (3 11 88).

The hazard of worker overload can be experienced during nominal flight from liftoff to LRB burnout (Number 1550 on MATRIX 3) (3 11 88).

The hazard of worker overload can be experienced during intact abort, including RTLS, TAL, AOA and ATO (Number 1572 on MATRIX 3) (3 11 88).

The hazard of worker overload can be experienced during separation of the LRB from the STS vehicle (Number 1594 on MATRIX 3) (3 11 88).

The hazard of worker overload can be experienced during descent from separation to ocean impact (Number 1616 on MATRIX 3) (3 11 88).

The hazard of worker overload can be experienced during splashdown events occuring at impact (disposable for expendables) (Number 1638 on MATRIX 3) (3 11 88).

LRB avionics can cause or be jeopardized by unsafe or unhygienic working conditions (Number 3 on MATRIX 1) (3 11 88).

The hazard of unsafe or unhygienic working conditions can be experienced during component or material purchase, including acquisition of GFP (Number 1199 on MATRIX 3) (3 11 88).

The hazard of unsafe or unhygienic working conditions can be experienced during nominal flight from liftoff to LRB burnout (Number 1551 on MATRIX 3) (3 11 88).The hazard of unsafe or unhygienic working conditions can be experienced during intact

abort, including RTLS, TAL, AOA and ATO (Number 1573 on MATRIX 3) (3 11 88).

The hazard of unsafe or unhygienic working conditions can be experienced during separation of the LRB from the STS vehicle (Number 1595 on MATRIX 3) (3 11 88).

The hazard of unsafe or unhygienic working conditions can be experienced during descent from separation to ocean impact (Number 1617 on MATRIX 3) (3 11 88).

The hazard of unsafe or unhygienic working conditions can be experienced during splashdown events occuring at impact (disposable for expendables) (Number 1639 on MATRIX 3) (3 11 88).

LRB avionics can cause or be jeopardized by meteoroids and meteorites (Number 4 on MATRIX 1) (3 11 88).

The hazard of meteoroids and meteorites can be experienced during component or material purchase, including acquisition of GFP (Number 1200 on MATRIX 3) (3 11 88).

The hazard of meteoroids and meteorites can be experienced during manufacture and fabrication of subsystems and components (Number 1222 on MATRIX 3) (3 11 88).

The hazard of meteoroids and meteorites can be experienced during inspection and test of the LRB and subsystems (Number 1244 on MATRIX 3) (3 11 88).

The hazard of meteoroids and meteorites can be experienced during proof test of pressure vessels and structure (Number 1266 on MATRIX 3) (3 11 88).

The hazard of meteoroids and meteorites can be experienced during acceptance test and checkout prior to delivery to the Government (Number 1288 on MATRIX 3) (3 11 88).

The hazard of meteoroids and meteorites can be experienced during test firing of engines and/or the completed booster (Number 1310 on MATRIX 3) (3 11 88).

The hazard of meteoroids and meteorites can be experienced during flight readiness firing (FRF) of the STS vehicle (Number 1332 on MATRIX 3) (3 11 88).

The hazard of meteoroids and meteorites can be experienced during preparation for shipment of the booster and ship loose hardware (Number 1354 on MATRIX 3) (3 11 88).

The hazard of meteoroids and meteorites can be experienced during transportation from manufacture to launch site or after recovery (Number 1376 on MATRIX 3) (3 11 88).

The hazard of meteoroids and meteorites can be experienced during storage, including storage of major components (Number 1398 on MATRIX 3) (3 11 88).

The hazard of meteoroids and meteorites can be experienced during preflight checkout prior to stacking (Number 1420 on MATRIX 3) (3 11 88).

The hazard of meteoroids and meteorites can be experienced during vehicle stacking, including ancillary test activities (Number 1442 on MATRIX 3) (3 11 88).

The hazard of meteoroids and meteorites can be experienced during rollout from the VAB and preloading preparation (Number 1464 on MATRIX 3) (3 11 88).

The hazard of meteoroids and meteorites can be experienced during propellant loading for test or flight (Number 1486 on MATRIX 3) (3 11 88).

The hazard of meteoroids and meteorites can be experienced during countdown to liftoff or abort (Number 1508 on MATRIX 3) (3 11 88).

The hazard of meteoroids and meteorites can be experienced during launch abort activities, including mission postponement (scrub) (Number 1530 on MATRIX 3) (3 11 88).

The hazard of meteoroids and meteorites can be experienced during nominal flight from liftoff to LRB burnout (Number 1552 on MATRIX 3) (3 11 88).

The hazard of meteoroids and meteorites can be experienced during intact abort, including RTLS, TAL, AOA and ATO (Number 1574 on MATRIX 3) (3 11 88).

The hazard of meteoroids and meteorites can be experienced during separation of the LRB from the STS vehicle (Number 1596 on MATRIX 3) (3 11 88).

The hazard of meteoroids and meteorites can be experienced during descent from separation to ocean impact (Number 1618 on MATRIX 3) (3 11 88).

The hazard of meteoroids and meteorites can be experienced during splashdown events occuring at impact (disposable for expendables) (Number 1640 on MATRIX 3) (3 11 88).

The hazard of meteoroids and meteorites can be experienced during floatation (of recoverable boosters) until recovery (Number 1662 on MATRIX 3) (3 11 88).

The hazard of meteoroids and meteorites can be experienced during recovery activities, including towing, and retrieval of recoverables (Number 1684 on MATRIX 3) (3 11 88).

The hazard of meteoroids and meteorites can be experienced during refurbishment

of reusable components (Number 1706 on MATRIX 3) (3 11 88).

LRB avionics can cause or be jeopardized by wind (Number 5 on MATRIX 1) (3 11 88).

The hazard of wind can be experienced during component or material purchase, including acquisition of GFP (Number 1201 on MATRIX 3) (3 11 88).

The hazard of wind can be experienced during manufacture and fabrication of subsystems and components (Number 1223 on MATRIX 3) (3 11 88).

The hazard of wind can be experienced during inspection and test of the LRB and subsystems (Number 1245 on MATRIX 3) (3 11 88).

The hazard of wind can be experienced during proof test of pressure vessels and structure (Number 1267 on MATRIX 3) (3 11 88).

The hazard of wind can be experienced during acceptance test and checkout prior to delivery to the Government (Number 1289 on MATRIX 3) (3 11 88).

The hazard of wind can be experienced during test firing of engines and/or the completed booster (Number 1311 on MATRIX 3) (3 11 88).

The hazard of wind can be experienced during flight readiness firing (FRF) of the STS vehicle (Number 1333 on MATRIX 3) (3 11 88).

The hazard of wind can be experienced during preparation for shipment of the booster and ship loose hardware (Number 1355 on MATRIX 3) (3 11 88).

The hazard of wind can be experienced during storage, including storage of major components (Number 1399 on MATRIX 3) (3 11 88).

The hazard of wind can be experienced during preflight checkout prior to stacking (Number 1421 on MATRIX 3) (3 11 88).

The hazard of wind can be experienced during vehicle stacking, including ancillary test activities (Number 1443 on MATRIX 3) (3 11 88).

The hazard of contamination can be experienced during component or material purchase, including acquisition of GFP (Number 1202 on MATRIX 3) (3 11 88).

The hazard of heat sources can be experienced during component or material purchase, including acquisition of GFP (Number 1203 on MATRIX 3) (3 11 88).

The hazard of heat sources can be experienced during manufacture and fabrication of subsystems and components (Number 1225 on MATRIX 3) (3 11 88).

The hazard of heat sources can be experienced during inspection and test of the LRB and subsystems (Number 1247 on MATRIX 3) (3 11 88).

The hazard of heat sources can be experienced during proof test of pressure vessels and structure (Number 1269 on MATRIX 3) (3 11 88).

The hazard of heat sources can be experienced during acceptance test and checkout prior to delivery to the Government (Number 1291 on MATRIX 3) (3 11 88).

The hazard of heat sources can be experienced during preparation for shipment of the booster and ship loose hardware (Number 1357 on MATRIX 3) (3 11 88).

The hazard of heat sources can be experienced during preflight checkout prior to stacking (Number 1423 on MATRIX 3) (3 11 88).

The hazard of heat sources can be experienced during vehicle stacking, including ancillary test activities (Number 1445 on MATRIX 3) (3 11 88).

The hazard of heat sources can be experienced during splashdown events occuring at impact (disposable for expendables) (Number 1643 on MATRIX 3) (3 11 88).

The hazard of heat sources can be experienced during floatation (of recoverable boosters) until recovery (Number 1665 on MATRIX 3) (3 11 88).

The hazard of heat sources can be experienced during recovery activities, including towing, and retrieval of recoverables (Number 1687 on MATRIX 3) (3 11 88).

The hazard of heat sources can be experienced during refurbishment of reusable components (Number 1709 on MATRIX 3) (3 11 88).

LRB avionics can cause or be jeopardized by radiation or sunlight (Number 8 on MATRIX 1) (3 11 88).

The hazard of radiation or sunlight can be experienced during component or material purchase, including acquisition of GFP (Number 1204 on MATRIX 3) (3 11 88).

The hazard of radiation or sunlight can be experienced during manufacture and fabrication of subsystems and components (Number 1226 on MATRIX 3) (3 11 88).

The hazard of radiation or sunlight can be experienced during proof test of pressure vessels and structure (Number 1270 on MATRIX 3) (3 11 88).

The hazard of radiation or sunlight can be experienced during preparation for shipment of the booster and ship loose hardware (Number 1358 on MATRIX 3) (3 11 88).

The hazard of radiation or sunlight can be experienced during storage, including storage of major components (Number 1402 on MATRIX 3) (3 11 88).

The hazard of radiation or sunlight can be experienced during preflight checkout prior to stacking (Number 1424 on MATRIX 3) (3 11 88).

LRB avionics can cause or be jeopardized by moisture or precipitation (Number 9 on MATRIX 1) (3 11 88).

The hazard of moisture or precipitation can be experienced during component or material purchase, including acquisition of GFP (Number 1205 on MATRIX 3) (3 11 88).

The hazard of moisture or precipitation can be experienced during manufacture and fabrication of subsystems and components (Number 1227 on MATRIX 3) (3 11 88).

The hazard of moisture or precipitation can be experienced during inspection and test of the LRB and subsystems (Number 1249 on MATRIX 3) (3 11 88)

The hazard of moisture or precipitation can be experienced during acceptance test and checkout prior to delivery to the Government (Number 1293 on MATRIX 3) (3 11 88).

The hazard of moisture or precipitation can be experienced during preparation for shipment of the booster and ship loose hardware (Number 1359 on MATRIX 3) (3 11 88).

The hazard of electrical system malfunction can be experienced during component or material purchase, including acquisition of GFP (Number 1206 on MATRIX 3) (3 11 88).

LRB avionics can cause or be jeopardized by differential pressure (Number 11 on MATRIX 1) (3 14 88).

The hazard of differential pressure can be experienced during component or material purchase, including acquisition of GFP (Number 1207 on MATRIX 3) (3 14 88).

The hazard of differential pressure can be experienced during manufacture and fabrication of subsystems and components (Number 1229 on MATRIX 3) (3 14 88).

The hazard of differential pressure can be experienced during inspection and test of the LRB and subsystems (Number 1251 on MATRIX 3) (3 14 88).

The hazard of differential pressure can be experienced during acceptance test and checkout prior to delivery to the Government (Number 1295 on MATRIX 3) (3 14 88).

The hazard of differential pressure can be experienced during preparation for shipment of the booster and ship loose hardware (Number 1361 on MATRIX 3) (3 14 88).

The hazard of differential pressure can be experienced during preflight checkout prior to stacking (Number 1427 on MATRIX 3) (3 14 88).

The hazard of differential pressure can be experienced during vehicle stacking, including ancillary test activities (Number 1449 on MATRIX 3) (3 14 88).

The hazard of differential pressure can be experienced during rollout from the VAB and preloading preparation (Number 1471 on MATRIX 3) (3 14 88).

The hazard of differential pressure can be experienced during refurbishment of reusable components (Number 1713 on MATRIX 3) (3 14 88).

The hazard of vibration, acoustic loads or shock can be experienced during component or material purchase, including acquisition of GFP (Number 1208 on MATRIX 3) (3 14 88).

The hazard of vibration, acoustic loads or shock can be experienced during manufacture and fabrication of subsystems and components (Number 1230 on MATRIX 3) (3 14 88).

The hazard of vibration, acoustic loads or shock can be experienced during inspection and test of the LRB and subsystems (Number 1252 on MATRIX 3) (3 14 88).

The hazard of vibration, acoustic loads or shock can be experienced during proof test of pressure vessels and structure (Number 1274 on MATRIX 3) (3 14 88).

The hazard of vibration, acoustic loads or shock can be experienced during acceptance test and checkout prior to delivery to the Government (Number 1296 on MATRIX 3) (3 14 88).

The hazard of vibration, acoustic loads or shock can be experienced during preparation for shipment of the booster and ship loose hardware (Number 1362 on MATRIX 3) (3 14 88).

The hazard of vibration, acoustic loads or shock can be experienced during storage, including storage of major components (Number 1406 on MATRIX 3) (3 14 88).

The hazard of vibration, acoustic loads or shock can be experienced during preflight checkout prior to stacking (Number 1428 on MATRIX 3) (3 14 88).

The hazard of vibration, acoustic loads or shock can be experienced during vehicle

stacking, including ancillary test activities (Number 1450 on MATRIX 3) (3 14 88).

The hazard of vibration, acoustic loads or shock can be experienced during rollout from the VAB and preloading preparation (Number 1472 on MATRIX 3) (3 14 88).

The hazard of vibration, acoustic loads or shock can be experienced during propellant loading for test or flight (Number 1494 on MATRIX 3) (3 14 88).

The hazard of vibration, acoustic loads or shock can be experienced during countdown to liftoff or abort (Number 1516 on MATRIX 3) (3 14 88).

The hazard of vibration, acoustic loads or shock can be experienced during floatation (of recoverable boosters) until recovery (Number 1670 on MATRIX 3) (3 14 88).

The hazard of vibration, acoustic loads or shock can be experienced during refurbishment of reusable components (Number 1714 on MATRIX 3) (3 14 88).

LRB avionics can cause or be jeopardized by structural loads (Number 13 on MATRIX 1) (3 14 88).

The hazard of structural loads can be experienced during component or material purchase, including acquisition of GFP (Number 1209 on MATRIX 3) (3 14 88).

The hazard of structural loads can be experienced during manufacture and fabrication of subsystems and components (Number 1231 on MATRIX 3) (3 14 88).

The hazard of structural loads can be experienced during inspection and test of the LRB and subsystems (Number 1253 on MATRIX 3) (3 14 88).

The hazard of structural loads can be experienced during acceptance test and checkout prior to delivery to the Government (Number 1297 on MATRIX 3) (3 14 88).

The hazard of structural loads can be experienced during preparation for shipment of the booster and ship loose hardware (Number 1363 on MATRIX 3) (3 14 88).

The hazard of structural loads can be experienced during storage, including storage of major components (Number 1407 on MATRIX 3) (3 14 88).

The hazard of structural loads can be experienced during preflight checkout prior to stacking (Number 1429 on MATRIX 3) (3 14 88).

The hazard of structural loads can be experienced during refurbishment of reusable components (Number 1715 on MATRIX 3) (3 14 88).

LRB avionics can cause or be jeopardized by leaks (Number 14 on MATRIX 1) (3 14 88).

The hazard of leaks can be experienced during component or material purchase, including acquisition of GFP (Number 1210 on MATRIX 3) (3 14 88).

The hazard of leaks can be experienced during manufacture and fabrication of subsystems and components (Number 1232 on MATRIX 3) (3 14 88).

The hazard of leaks can be experienced during preparation for shipment of the booster and ship loose hardware (Number 1364 on MATRIX 3) (3 14 88).

LRB avionics can cause or be jeopardized by propellant characteristics and products (Number 15 on MATRIX 1) (3 14 88).

The hazard of propellant characteristics and products can be experienced during component or material purchase, including acquisition of GFP (Number 1211 on MATRIX 3) (3 14 88).

The hazard of propellant characteristics and products can be experienced during manufacture and fabrication of subsystems and components (Number 1233 on MATRIX 3) (3 14 88).

The hazard of propellant characteristics and products can be experienced during inspection and test of the LRB and subsystems (Number 1255 on MATRIX 3) (3 14 88).

The hazard of propellant characteristics and products can be experienced during proof test of pressure vessels and structure (Number 1277 on MATRIX 3) (3 14 88).

The hazard of propellant characteristics and products can be experienced during acceptance test and checkout prior to delivery to the Government (Number 1299 on MATRIX 3) (3 14 88).

The hazard of propellant characteristics and products can be experienced during preparation for shipment of the booster and ship loose hardware (Number 1365 on MATRIX 3) (3 14 88).

The hazard of propellant characteristics and products can be experienced during preflight checkout prior to stacking (Number 1431 on MATRIX 3) (3 14 88).

The hazard of propellant characteristics and products can be experienced during vehicle stacking, including ancillary test activities (Number 1453 on MATRIX 3) (3 14 88).

LRB avionics can cause or be jeopardized by lightning or electromagnetic discharge (Number 16 on MATRIX 1) (3 14 88).

The hazard of lightning or electromagnetic discharge can be experienced during

component or material purchase, including acquisition of GFP (Number 1212 on MATRIX 3) (3 14 88).

The hazard of lightning or electromagnetic discharge can be experienced during manufacture and fabrication of subsystems and components (Number 1234 on MATRIX 3) (3 14 88).

The hazard of lightning or electromagnetic discharge can be experienced during inspection and test of the LRB and subsystems (Number 1256 on MATRIX 3) (3 14 88).

The hazard of lightning or electromagnetic discharge can be experienced during proof test of pressure vessels and structure (Number 1278 on MATRIX 3) (3 14 88).

The hazard of lightning or electromagnetic discharge can be experienced during acceptance test and checkout prior to delivery to the Government (Number 1300 on MATRIX 3) (3 14 88).

The hazard of lightning or electromagnetic discharge can be experienced during preparation for shipment of the booster and ship loose hardware (Number 1366 on MATRIX 3) (3 14 88).

The hazard of lightning or electromagnetic discharge can be experienced during preflight checkout prior to stacking (Number 1432 on MATRIX 3) (3 14 88).

The hazard of lightning or electromagnetic discharge can be experienced during vehicle stacking, including ancillary test activities (Number 1454 on MATRIX 3) (3 14 88).

The hazard of lightning or electromagnetic discharge can be experienced during refurbishment of reusable components (Number 1718 on MATRIX 3) (3 14 88).

LRB avionics can cause or be jeopardized by faulty documentation (Number 17 on MATRIX 1) (3 14 88).

The hazard of faulty documentation can be experienced during descent from separation to ocean impact (Number 1631 on MATRIX 3) (3 14 88).

The hazard of faulty documentation can be experienced during splashdown events occuring at impact (disposable for expendables) (Number 1653 on MATRIX 3) (3 14 88).

The hazard of faulty documentation can be experienced during floatation (of recoverable boosters) until recovery (Number 1675 on MATRIX 3) (3 14 88).

LRB avionics can cause or be jeopardized by chemical activity (Number 18 on

MATRIX 1) (3 14 88).

The hazard of chemical activity can be experienced during component or material purchase, including acquisition of GFP (Number 1214 on MATRIX 3) (3 14 88).

The hazard of computer system malfunction can be experienced during component or material purchase, including acquisition of GFP (Number 1215 on MATRIX 3) (3 14 88).

The hazard of computer system malfunction can be experienced during preparation for shipment of the booster and ship loose hardware (Number 1369 on MATRIX 3) (3 14 88).

LRB avionics can cause or be jeopardized by operator error (Number 20 on MATRIX 1) (3 14 88).

The hazard of operator error can be experienced during component or material purchase, including acquisition of GFP (Number 1216 on MATRIX 3) (3 14 88).

The hazard of operator error can be experienced during descent from separation to ocean impact (Number 1634 on MATRIX 3) (3 14 88).

The hazard of operator error can be experienced during splashdown events occuring at impact (disposable for expendables) (Number 1656 on MATRIX 3) (3 14 88).

The hazard of operator error can be experienced during floatation (of recoverable boosters) until recovery (Number 1678 on MATRIX 3) (3 14 88).

The hazard of wear can be experienced during component or material purchase, including acquisition of GFP (Number 1217 on MATRIX 3) (3 14 88).

The hazard of wear can be experienced during manufacture and fabrication of subsystems and components (Number 1239 on MATRIX 3) (3 14 88).

The hazard of wear can be experienced during preparation for shipment of the booster and ship loose hardware (Number 1371 on MATRIX 3) (3 14 88).

The hazard of wear can be experienced during storage, including storage of major components (Number 1415 on MATRIX 3) (3 14 88).

The hazard of wear can be experienced during preflight checkout prior to stacking (Number 1437 on MATRIX 3) (3 14 88).

The hazard of wear can be experienced during floatation (of recoverable boosters) until recovery (Number 1679 on MATRIX 3) (3 14 88).

The hazard of emergencies can be experienced during component or material purchase, including acquisition of GFP (Number 1218 on MATRIX 3) (3 14 88).

The booster separation system can cause hazards or be jeopardized during proof test of pressure vessels and structure (Number 652 on MATRIX 2) (3 14 88).

The booster separation system can cause hazards or be jeopardized during descent from separation to ocean impact (Number 1068 on MATRIX 2) (3 15 88).

The booster separation system can cause hazards or be jeopardized during splashdown events occuring at impact (disposable for expendables) (Number 1094 on MATRIX 2) (3 15 88).

The booster separation system can cause hazards or be jeopardized during floatation (of recoverable boosters) until recovery (Number 1120 on MATRIX 2) (3 15 88).

The booster separation system can cause hazards or be jeopardized during recovery activities, including towing, and retrieval of recoverables (Number 1146 on MATRIX 2) (3 15 88).

The booster separation system can cause or be jeopardized by worker overload (Number 24 on MATRIX 1) (3 15 88).

The booster separation system can cause or be jeopardized by unsafe or unhygienic working conditions (Number 25 on MATRIX 1) (3 15 88).

The booster separation system can cause or be jeopardized by meteoroids and meteorites (Number 26 on MATRIX 1) (3 15 88).

The booster separation system can cause or be jeopardized by wind (Number 27 on MATRIX 1) (3 15 88).

The booster separation system can cause or be jeopardized by contamination (Number 28 on MATRIX 1) (3 15 88).

The booster separation system can cause or be jeopardized by radiation or sunlight (Number 30 on MATRIX 1) (3 15 88).

The booster separation system can cause or be jeopardized by moisture or precipitation (Number 31 on MATRIX 1) (3 15 88).

The booster separation system can cause or be jeopardized by differential pressure (Number 33 on MATRIX 1) (3 15 88).

The booster separation system can cause or be jeopardized by structural loads

(Number 35 on MATRIX 1) (3 15 88).

The booster separation system can cause or be jeopardized by leaks (Number 36 on MATRIX 1) (3 15 88).

The booster separation system can cause or be jeopardized by propellant characteristics and products (Number 37 on MATRIX 1) (3 15 88).

The booster separation system can cause or be jeopardized by faulty documentation (Number 39 on MATRIX 1) (3 15 88).

The booster separation system can cause or be jeopardized by chemical activity (Number 40 on MATRIX 1) (3 15 88).

The booster separation system can cause or be jeopardized by wear (Number 43 on MATRIX 1) (3 16 88).

The flight crew can cause or be jeopardized by hazardous environments (Number 45 on MATRIX 1) (3 16 88).

The flight crew can cause hazards or be jeopardized during component or material purchase, including acquisition of GFP (Number 575 on MATRIX 2) (3 16 88).

The flight crew can cause hazards or be jeopardized during manufacture and fabrication of subsystems and components (Number 601 on MATRIX 2) (3 16 88).

The flight crew can cause hazards or be jeopardized during inspection and test of the LRB and subsystems (Number 627 on MATRIX 2) (3 16 88).

The flight crew can cause hazards or be jeopardized during proof test of pressure vessels and structure (Number 653 on MATRIX 2) (3 16 88).

The flight crew can cause hazards or be jeopardized during acceptance test and checkout prior to delivery to the Government (Number 679 on MATRIX 2) (3 16 88).

The flight crew can cause hazards or be jeopardized during test firing of engines and/or the completed booster (Number 705 on MATRIX 2) (3 16 88).

The flight crew can cause hazards or be jeopardized during flight readiness firing (FRF) of the STS vehicle (Number 731 on MATRIX 2) (3 16 88).

The flight crew can cause hazards or be jeopardized during preparation for shipment of the booster and ship loose hardware (Number 757 on MATRIX 2) (3 16 88).

The flight crew can cause hazards or be jeopardized during transportation from manufacture to launch site or after recovery (Number 783 on MATRIX 2) (3 16 88).

The flight crew can cause hazards or be jeopardized during storage, including storage of major components (Number 809 on MATRIX 2) (3 16 88).

The flight crew can cause hazards or be jeopardized during preflight checkout prior to stacking (Number 835 on MATRIX 2) (3 16 88).

The flight crew can cause hazards or be jeopardized during vehicle stacking, including ancillary test activities (Number 861 on MATRIX 2) (3 16 88).

The flight crew can cause hazards or be jeopardized during rollout from the VAB and preloading preparation (Number 887 on MATRIX 2) (3 16 88).

The flight crew can cause hazards or be jeopardized during descent from separation to ocean impact (Number 1069 on MATRIX 2) (3 16 88).

The flight crew can cause hazards or be jeopardized during splashdown events occuring at impact (disposable for expendables) (Number 1095 on MATRIX 2) (3 16 88).

The flight crew can cause hazards or be jeopardized during floatation (of recoverable boosters) until recovery (Number 1121 on MATRIX 2) (3 16 88).

The flight crew can cause hazards or be jeopardized during recovery activities, including towing, and retrieval of recoverables (Number 1147 on MATRIX 2) (3 16 88).

The flight crew can cause hazards or be jeopardized during refurbishment of reusable components (Number 1173 on MATRIX 2) (3 16 88).

The flight crew can cause or be jeopardized by meteoroids and meteorites (Number 48 on MATRIX 1) (3 17 88).

The flight crew can cause or be jeopardized by wind (Number 49 on MATRIX 1) (3 17 88).

The flight crew can cause or be jeopardized by contamination (Number 50 on MATRIX 1) (3 17 88).

The flight crew can cause or be jeopardized by heat sources (Number 51 on MATRIX 1) (3 17 88).

The flight crew can cause or be jeopardized by radiation or sunlight (Number 52 on MATRIX 1) (3 17 88).

The flight crew can cause or be jeopardized by moisture or precipitation (Number 53 on MATRIX 1) (3 17 88).

The flight crew can cause or be jeopardized by electrical system malfunction (Number 54 on MATRIX 1) (3 17 88).

The flight crew can cause or be jeopardized by differential pressure (Number 55 on MATRIX 1) (3 17 88).

The flight crew can cause or be jeopardized by structural loads (Number 57 on MATRIX 1) (3 17 88).

The flight crew can cause or be jeopardized by leaks (Number 58 on MATRIX 1) (3 17 88).

The flight crew can cause or be jeopardized by lightning or electromagnetic discharge (Number 60 on MATRIX 1) (3 17 88).

The flight crew can cause or be jeopardized by faulty documentation (Number 61 on MATRIX 1) (3 17 88).

The flight crew can cause or be jeopardized by chemical activity (Number 62 on MATRIX 1) (3 17 88).

The flight crew can cause or be jeopardized by computer system malfunction (Number 63 on MATRIX 1) (3 17 88).

The flight crew can cause or be jeopardized by wear (Number 65 on MATRIX 1) (3 18 88).

Parachutes and recovery aids can cause or be jeopardized by worker overload (Number 68 on MATRIX 1) (3 18 88).

Parachutes and recovery aids can cause or be jeopardized by meteoroids and meteorites (Number 70 on MATRIX 1) (3 18 88).

Parachutes and recovery aids can cause or be jeopardized by contamination (Number 72 on MATRIX 1) (3 18 88).

Parachutes and recovery aids can cause or be jeopardized by moisture or precipitation (Number 75 on MATRIX 1) (3 21 88).

Parachutes and recovery aids can cause or be jeopardized by differential pressure (Number 77 on MATRIX 1) (3 21 88).

Parachutes and recovery aids can cause or be jeopardized by vibration, acoustic loads or shock (Number 78 on MATRIX 1) (3 21 88).

Parachutes and recovery aids can cause or be jeopardized by structural loads

(Number 79 on MATRIX 1) (3 21 88).

Parachutes and recovery aids can cause or be jeopardized by leaks (Number 80 on MATRIX 1) (3 21 88).

Parachutes and recovery aids can cause or be jeopardized by propellant characteristics and products (Number 81 on MATRIX 1) (3 21 88).

Parachutes and recovery aids can cause or be jeopardized by faulty documentation (Number 83 on MATRIX 1) (3 22 88).

Parachutes and recovery aids can cause or be jeopardized by chemical activity (Number 84 on MATRIX 1) (3 22 88).

Parachutes and recovery aids can cause or be jeopardized by wear (Number 87 on MATRIX 1) (3 22 88).

The electrical system, batteries or APU can cause hazards or be jeopardized during proof test of pressure vessels and structure (Number 655 on MATRIX 2) (3 22 88).

The electrical system, batteries or APU can cause or be jeopardized by worker overload (Number 90 on MATRIX 1) (3 23 88).

The electrical system, batteries or APU can cause or be jeopardized by unsafe or unhygienic working conditions (Number 91 on MATRIX 1) (3 23 88).

The electrical system, batteries or APU can cause or be jeopardized by meteoroids and meteorites (Number 92 on MATRIX 1) (3 23 88).

The electrical system, batteries or APU can cause or be jeopardized by wind (Number 93 on MATRIX 1) (3 23 88).

The electrical system, batteries or APU can cause or be jeopardized by radiation or sunlight (Number 96 on MATRIX 1) (3 23 88).

The electrical system, batteries or APU can cause or be jeopardized by structural loads (Number 101 on MATRIX 1) (3 24 88).

The electrical system, batteries or APU can cause or be jeopardized by faulty documentation (Number 105 on MATRIX 1) (3 25 88).

The electrical system, batteries or APU can cause or be jeopardized by operator error (Number 108 on MATRIX 1) (3 25 88).

Launch facilities can cause hazards or be jeopardized during component or material purchase, including acquisition of GFP (Number 578 on MATRIX 2) (3 25 88).

Launch facilities can cause hazards or be jeopardized during manufacture and fabrication of subsystems and components (Number 604 on MATRIX 2) (3 25 88).

Launch facilities can cause hazards or be jeopardized during inspection and test of the LRB and subsystems (Number 630 on MATRIX 2) (3 25 88).

Launch facilities can cause hazards or be jeopardized during proof test of pressure vessels and structure (Number 656 on MATRIX 2) (3 25 88).

Launch facilities can cause hazards or be jeopardized during acceptance test and checkout prior to delivery to the Government (Number 682 on MATRIX 2) (3 25 88).

Launch facilities can cause hazards or be jeopardized during test firing of engines and/or the completed booster (Number 708 on MATRIX 2) (3 25 88).

Launch facilities can cause hazards or be jeopardized during preparation for shipment of the booster and ship loose hardware (Number 760 on MATRIX 2) (3 29 88).

Launch facilities can cause hazards or be jeopardized during transportation from manufacture to launch site or after recovery (Number 786 on MATRIX 2) (3 29 88).

Launch facilities can cause hazards or be jeopardized during storage, including storage of major components (Number 812 on MATRIX 2) (3 29 88).

Launch facilities can cause hazards or be jeopardized during nominal flight from liftoff to LRB burnout (Number 994 on MATRIX 2) (3 29 88).

Launch facilities can cause hazards or be jeopardized during intact abort, including RTLS, TAL, AOA and ATO (Number 1020 on MATRIX 2) (3 29 88).

Launch facilities can cause hazards or be jeopardized during separation of the LRB from the STS vehicle (Number 1046 on MATRIX 2) (3 29 88).

Launch facilities can cause hazards or be jeopardized during descent from separation to ocean impact (Number 1072 on MATRIX 2) (3 29 88).

Launch facilities can cause hazards or be jeopardized during splashdown events occuring at impact (disposable for expendables) (Number 1098 on MATRIX 2) (3 29 88).

Launch facilities can cause hazards or be jeopardized during floatation (of recoverable boosters) until recovery (Number 1124 on MATRIX 2) (3 29 88).

Launch facilities can cause hazards or be jeopardized during recovery activities, including towing, and retrieval of recoverables (Number 1150 on MATRIX 2) (3 29

88).

Launch facilities can cause or be jeopardized by meteoroids and meteorites (Number 114 on MATRIX 1) (3 29 88).

Launch facilities can cause or be jeopardized by wind (Number 115 on MATRIX 1) (3 29 88).

Launch facilities can cause or be jeopardized by radiation or sunlight (Number 118 on MATRIX 1) (3 29 88).

Launch facilities can cause or be jeopardized by moisture or precipitation (Number 119 on MATRIX 1) (3 29 88).

Launch facilities can cause or be jeopardized by wear (Number 131 on MATRIX 1) (3 30 88).

LRB/Ground interfaces can cause hazards or be jeopardized during descent from separation to ocean impact (Number 1073 on MATRIX 2) (3 30 88).

LRB/Ground interfaces can cause hazards or be jeopardized during splashdown events occuring at impact (disposable for expendables) (Number 1099 on MATRIX 2) (3 30 88).

LRB/Ground interfaces can cause hazards or be jeopardized during floatation (of recoverable boosters) until recovery (Number 1125 on MATRIX 2) (3 30 88).

LRB/Ground interfaces can cause or be jeopardized by meteoroids and meteorites (Number 136 on MATRIX 1) (3 30 88).

LRB/Ground interfaces can cause or be jeopardized by radiation or sunlight (Number 140 on MATRIX 1) (3 30 88).

LRB/Ground interfaces can cause or be jeopardized by moisture or precipitation (Number 141 on MATRIX 1) (3 30 88).

LRB/Ground interfaces can cause or be jeopardized by leaks (Number 146 on MATRIX 1) (4 1 88).

LRB/Ground interfaces can cause or be jeopardized by faulty documentation (Number 149 on MATRIX 1) (4 1 88).

LRB/Ground interfaces can cause or be jeopardized by wear (Number 153 on MATRIX 1) (4 2 88).

The LRB hazardous gas detection system can cause or be jeopardized by

meteoroids and meteorites (Number 158 on MATRIX 1) (4 2 88).

The LRB hazardous gas detection system can cause or be jeopardized by wind (Number 159 on MATRIX 1) (4 2 88).

The LRB hazardous gas detection system can cause or be jeopardized by radiation or sunlight (Number 162 on MATRIX 1) (4 4 88).

The LRB hazardous gas detection system can cause or be jeopardized by structural loads (Number 167 on MATRIX 1) (4 4 88).

The LRB hazardous gas detection system can cause or be jeopardized by computer system malfunction (Number 173 on MATRIX 1) (4 4 88).

The LRB hazardous gas detection system can cause or be jeopardized by wear (Number 175 on MATRIX 1) (4 4 88).

LRB/ET interfaces can cause or be jeopardized by meteoroids and meteorites (Number 180 on MATRIX 1) (4 6 88).

LRB/ET interfaces can cause or be jeopardized by wind (Number 181 on MATRIX 1) (4 6 88).

LRB/ET interfaces can cause or be jeopardized by radiation or sunlight (Number 184 on MATRIX 1) (4 7 88).

LRB/ET interfaces can cause or be jeopardized by moisture or precipitation (Number 185 on MATRIX 1) (4 7 88).

LRB/ET interfaces can cause or be jeopardized by leaks (Number 190 on MATRIX 1) (4 7 88).

LRB/ET interfaces can cause or be jeopardized by propellant characteristics and products (Number 191 on MATRIX 1) (4 7 88).

LRB/ET interfaces can cause or be jeopardized by chemical activity (Number 194 on MATRIX 1) (4 7 88).

LRB/ET interfaces can cause or be jeopardized by wear (Number 197 on MATRIX 1) (4 7 88).

The ET and components can cause hazards or be jeopardized during component or material purchase, including acquisition of GFP (Number 582 on MATRIX 2) (4 7 88).

The ET and components can cause hazards or be jeopardized during manufacture

and fabrication of subsystems and components (Number 608 on MATRIX 2) (4 7 88).

The ET and components can cause hazards or be jeopardized during inspection and test of the LRB and subsystems (Number 634 on MATRIX 2) (4 7 88).

The ET and components can cause hazards or be jeopardized during proof test of pressure vessels and structure (Number 660 on MATRIX 2) (4 7 88).

The ET and components can cause hazards or be jeopardized during acceptance test and checkout prior to delivery to the Government (Number 686 on MATRIX 2) (4 7 88).

The ET and components can cause hazards or be jeopardized during test firing of engines and/or the completed booster (Number 712 on MATRIX 2) (4 7 88).

The ET and components can cause hazards or be jeopardized during preparation for shipment of the booster and ship loose hardware (Number 764 on MATRIX 2) (4 8 88).

The ET and components can cause hazards or be jeopardized during transportation from manufacture to launch site or after recovery (Number 790 on MATRIX 2) (4 8 88).

The ET and components can cause hazards or be jeopardized during storage, including storage of major components (Number 816 on MATRIX 2) (4 8 88).

The ET and components can cause hazards or be jeopardized during preflight checkout prior to stacking (Number 842 on MATRIX 2) (4 8 88).

The ET and components can cause hazards or be jeopardized during splashdown events occuring at impact (disposable for expendables) (Number 1102 on MATRIX 2) (4 8 88).

The ET and components can cause hazards or be jeopardized during floatation (of recoverable boosters) until recovery (Number 1128 on MATRIX 2) (4 8 88).

The ET and components can cause hazards or be jeopardized during recovery activities, including towing, and retrieval of recoverables (Number 1154 on MATRIX 2) (4 8 88).

The ET and components can cause hazards or be jeopardized during refurbishment of reusable components (Number 1180 on MATRIX 2) (4 8 88).

The ET and components can cause or be jeopardized by worker overload (Number 200 on MATRIX 1) (4 8 88).

The ET and components can cause or be jeopardized by unsafe or unhygienic working conditions (Number 201 on MATRIX 1) (4 8 88).

The ET and components can cause or be jeopardized by meteoroids and meteorites (Number 202 on MATRIX 1) (4 8 88).

The ET and components can cause or be jeopardized by wind (Number 203 on MATRIX 1) (4 8 88).

The ET and components can cause or be jeopardized by contamination (Number 204 on MATRIX 1) (4 8 88).

The ET and components can cause or be jeopardized by radiation or sunlight (Number 206 on MATRIX 1) (4 8 88).

The ET and components can cause or be jeopardized by moisture or precipitation (Number 207 on MATRIX 1) (4 8 88).

The ET and components can cause or be jeopardized by electrical system malfunction (Number 208 on MATRIX 1) (4 8 88).

The ET and components can cause or be jeopardized by differential pressure (Number 209 on MATRIX 1) (4 8 88).

The ET and components can cause or be jeopardized by structural loads (Number 211 on MATRIX 1) (4 8 88).

The ET and components can cause or be jeopardized by propellant characteristics and products (Number 213 on MATRIX 1) (4 8 88).

The ET and components can cause or be jeopardized by lightning or electromagnetic discharge (Number 214 on MATRIX 1) (4 8 88).

The ET and components can cause or be jeopardized by faulty documentation (Number 215 on MATRIX 1) (4 8 88).

The ET and components can cause or be jeopardized by computer system malfunction (Number 217 on MATRIX 1) (4 8 88).

The ET and components can cause or be jeopardized by wear (Number 219 on MATRIX 1) (4 8 88).

Cryogenic tanks and systems can cause or be jeopardized by worker overload (Number 222 on MATRIX 1) (4 10 88).

Cryogenic tanks and systems can cause or be jeopardized by meteoroids and

meteorites (Number 224 on MATRIX 1) (4 10 88).

Cryogenic tanks and systems can cause or be jeopardized by wind (Number 225 on MATRIX 1) (4 10 88).

Cryogenic tanks and systems can cause or be jeopardized by radiation or sunlight (Number 228 on MATRIX 1) (4 10 88).

Cryogenic tanks and systems can cause or be jeopardized by structural loads (Number 233 on MATRIX 1) (4 12 88).

Cryogenic tanks and systems can cause or be jeopardized by faulty documentation (Number 237 on MATRIX 1) (4 13 88).

Cryogenic tanks and systems can cause or be jeopardized by computer system malfunction (Number 239 on MATRIX 1) (4 13 88).

Cryogenic tanks and systems can cause or be jeopardized by operator error (Number 240 on MATRIX 1) (4 13 88).

Cryogenic tanks and systems can cause or be jeopardized by wear (Number 241 on MATRIX 1) (4 13 88).

The liquid injection system (if used) can cause or be jeopardized by worker overload (Number 244 on MATRIX 1) (4 14 88).

The liquid injection system (if used) can cause or be jeopardized by meteoroids and meteorites (Number 246 on MATRIX 1) (4 14 88).

The liquid injection system (if used) can cause or be jeopardized by wind (Number 247 on MATRIX 1) (4 14 88).

The liquid injection system (if used) can cause or be jeopardized by radiation or sunlight (Number 250 on MATRIX 1) (4 14 88).

The liquid injection system (if used) can cause or be jeopardized by faulty documentation (Number 259 on MATRIX 1) (4 14 88).

The liquid injection system (if used) can cause or be jeopardized by operator error (Number 262 on MATRIX 1) (4 14 88).

The liquid injection system (if used) can cause or be jeopardized by wear (Number 263 on MATRIX 1) (4 14 88).

Engines and/or controllers can cause or be jeopardized by hazardous environments (Number 265 on MATRIX 1) (4 14 88).

Engines and/or controllers can cause or be jeopardized by worker overload (Number 266 on MATRIX 1) (4 14 88).

Engines and/or controllers can cause or be jeopardized by meteoroids and meteorites (Number 268 on MATRIX 1) (4 15 88).

Engines and/or controllers can cause or be jeopardized by wind (Number 269 on MATRIX 1) (4 15 88).

Engines and/or controllers can cause or be jeopardized by propellant characteristics and products (Number 279 on MATRIX 1) (4 18 88).

Engines and/or controllers can cause or be jeopardized by operator error (Number 284 on MATRIX 1) (4 18 88).

TVC actuators and subsystem can cause or be jeopardized by hazardous environments (Number 287 on MATRIX 1) (4 18 88).

TVC actuators and subsystem can cause or be jeopardized by worker overload (Number 288 on MATRIX 1) (4 18 88).

TVC actuators and subsystem can cause or be jeopardized by meteoroids and meteorites (Number 290 on MATRIX 1) (4 19 88).

TVC actuators and subsystem can cause or be jeopardized by wind (Number 291 on MATRIX 1) (4 19 88).

TVC actuators and subsystem can cause or be jeopardized by propellant characteristics and products (Number 301 on MATRIX 1) (4 19 88).

TVC actuators and subsystem can cause or be jeopardized by operator error (Number 306 on MATRIX 1) (4 19 88).

The Orbiter, subsystems and payload can cause or be jeopardized by hazardous environments (Number 309 on MATRIX 1) (4 19 88).

The Orbiter, subsystems and payload can cause hazards or be jeopardized during component or material purchase, including acquisition of GFP (Number 587 on MATRIX 2) (4 19 88).

The Orbiter, subsystems and payload can cause hazards or be jeopardized during manufacture and fabrication of subsystems and components (Number 613 on MATRIX 2) (4 19 88).

The Orbiter, subsystems and payload can cause hazards or be jeopardized during inspection and test of the LRB and subsystems (Number 639 on MATRIX 2) (4 19 88).

The Orbiter, subsystems and payload can cause hazards or be jeopardized during proof test of pressure vessels and structure (Number 665 on MATRIX 2) (4 19 88).

The Orbiter, subsystems and payload can cause hazards or be jeopardized during acceptance test and checkout prior to delivery to the Government (Number 691 on MATRIX 2) (4 19 88).

The Orbiter, subsystems and payload can cause hazards or be jeopardized during test firing of engines and/or the completed booster (Number 717 on MATRIX 2) (4 19 88).

The Orbiter, subsystems and payload can cause hazards or be jeopardized during preparation for shipment of the booster and ship loose hardware (Number 769 on MATRIX 2) (4 19 88).

The Orbiter, subsystems and payload can cause hazards or be jeopardized during transportation from manufacture to launch site or after recovery (Number 795 on MATRIX 2) (4 19 88).

The Orbiter, subsystems and payload can cause hazards or be jeopardized during storage, including storage of major components (Number 821 on MATRIX 2) (4 19 88).

The Orbiter, subsystems and payload can cause hazards or be jeopardized during preflight checkout prior to stacking (Number 847 on MATRIX 2) (4 19 88).

The Orbiter, subsystems and payload can cause hazards or be jeopardized during descent from separation to ocean impact (Number 1081 on MATRIX 2) (4 19 88).

The Orbiter, subsystems and payload can cause hazards or be jeopardized during splashdown events occuring at impact (disposable for expendables) (Number 1107 on MATRIX 2) (4 19 88).

The Orbiter, subsystems and payload can cause hazards or be jeopardized during floatation (of recoverable boosters) until recovery (Number 1133 on MATRIX 2) (4 19 88).

The Orbiter, subsystems and payload can cause hazards or be jeopardized during recovery activities, including towing, and retrieval of recoverables (Number 1159 on MATRIX 2) (4 19 88).

The Orbiter, subsystems and payload can cause hazards or be jeopardized during refurbishment of reusable components (Number 1185 on MATRIX 2) (4 19 88).

The Orbiter, subsystems and payload can cause or be jeopardized by worker overload (Number 310 on MATRIX 1) (4 19 88).

The Orbiter, subsystems and payload can cause or be jeopardized by unsafe or unhygienic working conditions (Number 311 on MATRIX 1) (4 19 88).

The Orbiter, subsystems and payload can cause or be jeopardized by meteoroids and meteorites (Number 312 on MATRIX 1) (4 19 88).

The Orbiter, subsystems and payload can cause or be jeopardized by wind (Number 313 on MATRIX 1) (4 19 88).

The Orbiter, subsystems and payload can cause or be jeopardized by radiation or sunlight (Number 316 on MATRIX 1) (4 20 88).

The Orbiter, subsystems and payload can cause or be jeopardized by moisture or precipitation (Number 317 on MATRIX 1) (4 20 88).

The Orbiter, subsystems and payload can cause or be jeopardized by propellant characteristics and products (Number 323 on MATRIX 1) (4 20 88).

The Orbiter, subsystems and payload can cause or be jeopardized by lightning or electromagnetic discharge (Number 324 on MATRIX 1) (4 20 88).

The Orbiter, subsystems and payload can cause or be jeopardized by chemical activity (Number 326 on MATRIX 1) (4 20 88).

The Orbiter, subsystems and payload can cause or be jeopardized by operator error (Number 328 on MATRIX 1) (4 20 88).

The Orbiter, subsystems and payload can cause or be jeopardized by wear (Number 329 on MATRIX 1) (4 20 88).

Propellants and/or propulsion systems can cause or be jeopardized by meteoroids and meteorites (Number 334 on MATRIX 1) (4 20 88).

Propellants and/or propulsion systems can cause or be jeopardized by wind (Number 335 on MATRIX 1) (4 20 88).

Propellants and/or propulsion systems can cause or be jeopardized by radiation or sunlight (Number 338 on MATRIX 1) (4 22 88).

Propellants and/or propulsion systems can cause or be jeopardized by structural loads (Number 343 on MATRIX 1) (4 22 88).

Propellants and/or propulsion systems can cause or be jeopardized by computer system malfunction (Number 349 on MATRIX 1) (4 22 88).

Propellants and/or propulsion systems can cause or be jeopardized by wear

(Number 351 on MATRIX 1) (4 22 88).

Crew access provisions can cause hazards or be jeopardized during nominal flight from liftoff to LRB burnout (Number 1005 on MATRIX 2) (4 24 88).

Crew access provisions can cause hazards or be jeopardized during intact abort, including RTLS, TAL, AOA and ATO (Number 1031 on MATRIX 2) (4 24 88).

Crew access provisions can cause hazards or be jeopardized during separation of the LRB from the STS vehicle (Number 1057 on MATRIX 2) (4 24 88).

Crew access provisions can cause hazards or be jeopardized during descent from separation to ocean impact (Number 1083 on MATRIX 2) (4 24 88).

Crew access provisions can cause hazards or be jeopardized during splashdown events occuring at impact (disposable for expendables) (Number 1109 on MATRIX 2) (4 24 88).

Crew access provisions can cause hazards or be jeopardized during floatation (of recoverable boosters) until recovery (Number 1135 on MATRIX 2) (4 24 88).

Crew access provisions can cause or be jeopardized by meteoroids and meteorites (Number 356 on MATRIX 1) (4 24 88).

Crew access provisions can cause or be jeopardized by wind (Number 357 on MATRIX 1) (4 24 88).

Crew access provisions can cause or be jeopardized by contamination (Number 358 on MATRIX 1) (4 24 88).

Crew access provisions can cause or be jeopardized by heat sources (Number 359 on MATRIX 1) (4 24 88).

Crew access provisions can cause or be jeopardized by radiation or sunlight (Number 360 on MATRIX 1) (4 24 88).

Crew access provisions can cause or be jeopardized by differential pressure (Number 363 on MATRIX 1) (4 24 88).

Crew access provisions can cause or be jeopardized by vibration, acoustic loads or shock (Number 364 on MATRIX 1) (4 24 88).

Crew access provisions can cause or be jeopardized by structural loads (Number 365 on MATRIX 1) (4 24 88).

Crew access provisions can cause or be jeopardized by chemical activity (Number

Crew access provisions can cause or be jeopardized by wear (Number 373 on MATRIX 1) (4 24 88).

The range safety system can cause hazards or be jeopardized during proof test of pressure vessels and structure (Number 668 on MATRIX 2) (4 25 88).

The range safety system can cause or be jeopardized by worker overload (Number 376 on MATRIX 1) (4 25 88).

The range safety system can cause or be jeopardized by meteoroids and meteorites (Number 378 on MATRIX 1) (4 25 88).

The range safety system can cause or be jeopardized by wind (Number 379 on MATRIX 1) (4 25 88).

The range safety system can cause or be jeopardized by contamination (Number 380 on MATRIX 1) (4 25 88).

The range safety system can cause or be jeopardized by moisture or precipitation (Number 383 on MATRIX 1) (4 27 88).

The range safety system can cause or be jeopardized by differential pressure (Number 385 on MATRIX 1) (4 27 88).

The range safety system can cause or be jeopardized by structural loads (Number 387 on MATRIX 1) (4 28 88).

The range safety system can cause or be jeopardized by leaks (Number 388 on MATRIX 1) (4 28 88).

The range safety system can cause or be jeopardized by propellant characteristics and products (Number 389 on MATRIX 1) (4 28 88).

The range safety system can cause or be jeopardized by faulty documentation (Number 391 on MATRIX 1) (4 28 88).

The range safety system can cause or be jeopardized by chemical activity (Number 392 on MATRIX 1) (4 28 88).

The range safety system can cause or be jeopardized by wear (Number 395 on MATRIX 1) (4 28 88).

Vehicle structure and material can cause or be jeopardized by hazardous environments (Number 397 on MATRIX 1) (4 28 88).

Vehicle structure and material can cause or be jeopardized by worker overload

(Number 398 on MATRIX 1) (4 28 88).

Vehicle structure and material can cause or be jeopardized by meteoroids and meteorites (Number 400 on MATRIX 1) (4 28 88).

Vehicle structure and material can cause or be jeopardized by wind (Number 401 on MATRIX 1) (4 28 88).

Vehicle structure and material can cause or be jeopardized by contamination (Number 402 on MATRIX 1) (4 28 88).

Vehicle structure and material can cause or be jeopardized by radiation or sunlight (Number 404 on MATRIX 1) (4 28 88).

Vehicle structure and material can cause or be jeopardized by moisture or precipitation (Number 405 on MATRIX 1) (4 28 88).

Vehicle structure and material can cause or be jeopardized by electrical system malfunction (Number 406 on MATRIX 1) (4 28 88).

Vehicle structure and material can cause or be jeopardized by faulty documentation (Number 413 on MATRIX 1) (4 28 88).

Vehicle structure and material can cause or be jeopardized by computer system malfunction (Number 415 on MATRIX 1) (4 28 88).

Vehicle structure and material can cause or be jeopardized by wear (Number 417 on MATRIX 1) (4 28 88).

Thermal protection subsystems can cause or be jeopardized by hazardous environments (Number 419 on MATRIX 1) (4 28 88).

Thermal protection subsystems can cause or be jeopardized by worker overload (Number 420 on MATRIX 1) (4 28 88).

Thermal protection subsystems can cause or be jeopardized by meteoroids and meteorites (Number 422 on MATRIX 1) (5 2 88).

Thermal protection subsystems can cause or be jeopardized by wind (Number 423 on MATRIX 1) (5 2 88).

Thermal protection subsystems can cause or be jeopardized by contamination (Number 424 on MATRIX 1) (5 2 88).

Thermal protection subsystems can cause or be jeopardized by electrical system malfunction (Number 428 on MATRIX 1) (5 2 88).

Thermal protection subsystems can cause or be jeopardized by differential pressure (Number 429 on MATRIX 1) (5 2 88).

Thermal protection subsystems can cause or be jeopardized by structural loads (Number 431 on MATRIX 1) (5 2 88).

Thermal protection subsystems can cause or be jeopardized by faulty documentation (Number 435 on MATRIX 1) (5 2 88).

Thermal protection subsystems can cause or be jeopardized by chemical activity (Number 436 on MATRIX 1) (5 2 88).

Thermal protection subsystems can cause or be jeopardized by computer system malfunction (Number 437 on MATRIX 1) (5 2 88).

Thermal protection subsystems can cause or be jeopardized by operator error (Number 438 on MATRIX 1) (5 2 88).

The environment or the public can cause hazards or be jeopardized during component or material purchase, including acquisition of GFP (Number 593 on MATRIX 2) (5 2 88).

The environment or the public can cause hazards or be jeopardized during acceptance test and checkout prior to delivery to the Government (Number 697 on MATRIX 2) (5 4 88).

The environment or the public can cause hazards or be jeopardized during preparation for shipment of the booster and ship loose hardware (Number 775 on MATRIX 2) (5 4 88).

The environment or the public can cause hazards or be jeopardized during preflight checkout prior to stacking (Number 853 on MATRIX 2) (5 4 88).

The environment or the public can cause hazards or be jeopardized during separation of the LRB from the STS vehicle (Number 1061 on MATRIX 2) (5 4 88).

The environment or the public can cause or be jeopardized by meteoroids and meteorites (Number 444 on MATRIX 1) (5 4 88).

The environment or the public can cause or be jeopardized by radiation or sunlight (Number 448 on MATRIX 1) (5 4 88).

The environment or the public can cause or be jeopardized by structural loads (Number 453 on MATRIX 1) (5 4 88).

The environment or the public can cause or be jeopardized by faulty documentation

(Number 457 on MATRIX 1) (5 4 88).

The environment or the public can cause or be jeopardized by wear (Number 461 on MATRIX 1) (5 4 88).

Computer systems or software can cause or be jeopardized by hazardous environments (Number 463 on MATRIX 1) (5 4 88).

Computer systems or software can cause or be jeopardized by worker overload (Number 464 on MATRIX 1) (5 4 88).

Computer systems or software can cause or be jeopardized by meteoroids and meteorites (Number 466 on MATRIX 1) (5 9 88).

Computer systems or software can cause or be jeopardized by wind (Number 467 on MATRIX 1) (5 9 88).

Computer systems or software can cause or be jeopardized by contamination (Number 468 on MATRIX 1) (5 9 88).

Computer systems or software can cause or be jeopardized by heat sources (Number 469 on MATRIX 1) (5 9 88).

Computer systems or software can cause or be jeopardized by moisture or precipitation (Number 471 on MATRIX 1) (5 9 88).

Computer systems or software can cause or be jeopardized by differential pressure (Number 473 on MATRIX 1) (5 9 88).

Computer systems or software can cause or be jeopardized by structural loads (Number 475 on MATRIX 1) (5 10 88).

Computer systems or software can cause or be jeopardized by leaks (Number 476 on MATRIX 1) (5 10 88).

Computer systems or software can cause or be jeopardized by propellant characteristics and products (Number 477 on MATRIX 1) (5 10 88).

Computer systems or software can cause or be jeopardized by chemical activity (Number 480 on MATRIX 1) (5 10 88).

Computer systems or software can cause or be jeopardized by operator error (Number 482 on MATRIX 1) (5 10 88).

Computer systems or software can cause or be jeopardized by wear (Number 483 on MATRIX 1) (5 10 88).

The pressurization subsystem can cause or be jeopardized by hazardous environments (Number 485 on MATRIX 1) (5 10 88).

The pressurization subsystem can cause or be jeopardized by worker overload (Number 486 on MATRIX 1) (5 10 88).

The pressurization subsystem can cause or be jeopardized by unsafe or unhygienic working conditions (Number 487 on MATRIX 1) (5 10 88).

The pressurization subsystem can cause or be jeopardized by meteoroids and meteorites (Number 488 on MATRIX 1) (5 10 88).

The pressurization subsystem can cause or be jeopardized by wind (Number 489 on MATRIX 1) (5 10 88).

The pressurization subsystem can cause or be jeopardized by contamination (Number 490 on MATRIX 1) (5 10 88).

The pressurization subsystem can cause or be jeopardized by heat sources (Number 491 on MATRIX 1) (5 10 88).

The pressurization subsystem can cause or be jeopardized by radiation or sunlight (Number 492 on MATRIX 1) (5 10 88).

The pressurization subsystem can cause or be jeopardized by moisture or precipitation (Number 493 on MATRIX 1) (5 10 88).

The pressurization subsystem can cause or be jeopardized by structural loads (Number 497 on MATRIX 1) (6 23 88).

The pressurization subsystem can cause or be jeopardized by faulty documentation (Number 501 on MATRIX 1) (6 23 88).

The pressurization subsystem can cause or be jeopardized by operator error (Number 504 on MATRIX 1) (6 23 88).

The pressurization subsystem can cause or be jeopardized by wear (Number 505 on MATRIX 1) (6 23 88).

Personnel can cause hazards or be jeopardized during nominal flight from liftoff to LRB burnout (Number 1012 on MATRIX 2) (6 15 88).

Personnel can cause hazards or be jeopardized during intact abort, including RTLS, TAL, AOA and ATO (Number 1038 on MATRIX 2) (6 15 88).

Personnel can cause hazards or be jeopardized during separation of the LRB from

the STS vehicle (Number 1064 on MATRIX 2) (6 15 88).

Personnel can cause hazards or be jeopardized during descent from separation to ocean impact (Number 1090 on MATRIX 2) (6 15 88).

Personnel can cause hazards or be jeopardized during splashdown events occuring at impact (disposable for expendables) (Number 1116 on MATRIX 2) (6 15 88).

Personnel can cause hazards or be jeopardized during floatation (of recoverable boosters) until recovery (Number 1142 on MATRIX 2) (6 15 88).

Personnel can cause or be jeopardized by meteoroids and meteorites (Number 510 on MATRIX 1) (6 15 88).

Personnel can cause or be jeopardized by wind (Number 511 on MATRIX 1) (6 15 88).

Personnel can cause or be jeopardized by moisture or precipitation (Number 515 on MATRIX 1) (6 16 88).

Personnel can cause or be jeopardized by structural loads (Number 519 on MATRIX 1) (6 16 88).

Personnel can cause or be jeopardized by leaks (Number 520 on MATRIX 1) (6 16 88).

Personnel can cause or be jeopardized by chemical activity (Number 524 on MATRIX 1) (6 16 88).

Personnel can cause or be jeopardized by wear (Number 527 on MATRIX 1) (6 16 88).

Controls and displays can cause or be jeopardized by hazardous environments (Number 529 on MATRIX 1) (6 16 88).

Controls and displays can cause hazards or be jeopardized during descent from separation to ocean impact (Number 1091 on MATRIX 2) (6 16 88).

Controls and displays can cause hazards or be jeopardized during splashdown events occuring at impact (disposable for expendables) (Number 1117 on MATRIX 2) (6 16 88).

Controls and displays can cause or be jeopardized by meteoroids and meteorites (Number 532 on MATRIX 1) (6 20 88).

Controls and displays can cause or be jeopardized by wind (Number 533 on MATRIX 1) (6 20 88).

Controls and displays can cause or be jeopardized by contamination (Number 534 on MATRIX 1) (6 20 88).

Controls and displays can cause or be jeopardized by heat sources (Number 535 on MATRIX 1) (6 20 88).

Controls and displays can cause or be jeopardized by radiation or sunlight (Number 536 on MATRIX 1) (6 20 88).

Controls and displays can cause or be jeopardized by moisture or precipitation (Number 537 on MATRIX 1) (6 20 88).

Controls and displays can cause or be jeopardized by differential pressure (Number 539 on MATRIX 1) (6 20 88).

Controls and displays can cause or be jeopardized by vibration, acoustic loads or shock (Number 540 on MATRIX 1) (6 20 88).

Controls and displays can cause or be jeopardized by structural loads (Number 541 on MATRIX 1) (6 20 88).

Controls and displays can cause or be jeopardized by leaks (Number 542 on MATRIX 1) (6 20 88).

Controls and displays can cause or be jeopardized by propellant characteristics and products (Number 543 on MATRIX 1) (6 20 88).

Controls and displays can cause or be jeopardized by lightning or electromagnetic discharge (Number 544 on MATRIX 1) (6 20 88).

Controls and displays can cause or be jeopardized by chemical activity (Number 546 on MATRIX 1) (6 20 88).

Controls and displays can cause or be jeopardized by wear (Number 549 on MATRIX 1) (6 20 88).

Caution and warning systems can cause or be jeopardized by meteoroids and meteorites (Number 554 on MATRIX 1) (6 20 88).

Caution and warning systems can cause or be jeopardized by contamination (Number 556 on MATRIX 1) (6 20 88).

Caution and warning systems can cause or be jeopardized by radiation or sunlight (Number 558 on MATRIX 1) (6 20 88).

Caution and warning systems can cause or be jeopardized by wear (Number 571 on MATRIX 1) (6 21 88).

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-A-001 (LRB-P-A-678)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: A - Avionics

DATE: 5 / 2 / 88

HAZARD TITLE: LRB avionics can cause or be jeopardized by heat sources during test firing of engines and/or the completed booster.

HAZARDOUS CONDITION: When the completed booster is test fired, the environmental temperature in the vicinity of the test site will be higher than at any other time, except possibly during FRF. If the avionics package is installed at this time, heat loads may be excessive.

HAZARD CAUSE: High heat loads during test firing

HAZARD EFFECT: Damage to flight hardware

HAZARD LEVEL: Critical

SAFETY REQUIREMENTS: Design the package to safely withstand the heat loads encountered. A determination of the actual heat loading, possibly by measurement during firing, is required. Alternately, the avionics could be cooled by purging during test firing.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

1) The avionics package should be designed to withstand the heating environment. This hazard is then eliminated by design of the avionics package and by the results of the analysis or test which determines the actual temperature. The test would be a special procedure and the temperature warning apparatus may be considered a warning device.

2) The avionics package should be cooled by purging; this purge is an appropriate safety device.

VERIFICATION METHODS: Operation and maintenance instructions

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-A-002 (LRB-P-A-679)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: A - Avionics

DATE: 5 / 2 / 88

HAZARD TITLE: LRB avionics can cause or be jeopardized by heat sources during flight readiness firing (FRF) of the STS vehicle.

HAZARDOUS CONDITION: Since LRBs can be throttled down after ignition, it is likely that a FRF will involve firing the LRBs as well as the SSMEs. The simultaneous firing of all engines will result in higher heat loads than previously experienced in the vicinity of the launch pad. Heat loading or heat soak into the avionics package may cause damage to the avionics.

HAZARD CAUSE: High heat loads imposed on the STS vehicle during FRF.

HAZARD EFFECT: Damage to flight hardware

HAZARD LEVEL: Critical

SAFETY REQUIREMENTS: Design the avionics package to withstand the high heat load, which must then be verified by test, and cool the avionics package by purging.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

1) The avionics package should be designed to withstand the heating environment, then this hazard is eliminated by design of the avionics package and by the results of the test which determines the actual temperature. The test would be a special procedure and the temperature warning apparatus may be considered a warning device.

2) The avionics package should be cooled by purging; this purge is an appropriate safety device.

3) If the avionics package is designed to withstandthe higher heat loads, this hazard would be minimized by design. Verification of the heat loading at the location of the avionics package would be a warning device.

4) If the avionics is cooled by purging during FRF, this would be a special procedure and an appropriate safety device.

VERIFICATION METHODS:

1) Verification of the design and heat loading would be accomplished by manufacturing process plans and functional test, respectively.

2) Purging of the avionics would be verified by operation and maintenance instructions.

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-A-003 (LRB-P-A-751)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: A - Avionics

DATE: 5 / 2 / 88

HAZARD TITLE: LRB avionics can cause or be jeopardized by electrical system malfunction during flight readiness firing (FRF) of the STS vehicle.

HAZARDOUS CONDITION: Facilities electrical equipment is not designed to the same standards of quality, safety and reliability as flight equipment. Due to the increased monitoring and control requirements required by liquid, as opposed to solid rocket boosters, additional facilities monitoring and control equipment will be required. Failure of this equipment may cause unacceptable voltages, currents and/or electromagnetic fields to be imposed on the LRB vehicle(s).

HAZARD CAUSE: Malfunction of facilities electrical equipment

HAZARD EFFECT: Damage to flight hardware

HAZARD LEVEL: Critical

SAFETY REQUIREMENTS: Design facilities electrical equipment to fail safe.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Functional test to demonstrate reliability and operational verification.

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-A-004 (LRB-P-A-761)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: A - Avionics

DATE: 5 / 2 / 88

HAZARD TITLE: LRB avionics can cause or be jeopardized by electrical system malfunction during nominal flight from liftoff to LRB burnout.

HAZARDOUS CONDITION: An electrical malfunction in one of the LRBs may cause erroneous position or rate data, resulting in erroneous correction signals being sent by the affected LRB to its TVC system. The attempt by each TVC system to follow a different trajectory would place unacceptable stresses on the STS vehicle.

HAZARD CAUSE: Malfunction of LRB electronics.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Provide avionics position and rate arbitration to resolve disputes between different avionics packages. Backup TVC direction from either the unaffected LRB, the Orbiter, or the ground may be required. Design the avionics packages to fail safe.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Provides appropriate safety devices

VERIFICATION METHODS: Functional test to provide reliability demonstration and functional verification.

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-A-005 (LRB-P-A-798)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: A - Avionics

DATE: 5 / 2 / 88

HAZARD TITLE: LRB avionics can cause or be jeopardized by vibration, acoustic loads or shock during test firing of engines and/or the completed booster.

HAZARDOUS CONDITION: Acoustic loads during test firing have not yet been defined for the completed booster. If avionics packages are installed prior to test firing, they may be damaged by excessive vibrational or acoustic loads.

HAZARD CAUSE: Acoustic loads during test firing

HAZARD EFFECT: Damage to flight hardware

HAZARD LEVEL: Critical

SAFETY REQUIREMENTS: Design the package to safely withstand the acoustic loads encountered. A determination of the actual acoustic loads encountered, possibly by actual measurement during test firing, will be required.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test for reliability deomonstration and functional verification.

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-A-006 (LRB-P-A-799)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: A - Avionics

DATE: 5 / 2 / 88

HAZARD TITLE: LRB avionics can cause or be jeopardized by vibration, acoustic loads or shock during flight readiness firing (FRF) of the STS vehicle.

HAZARDOUS CONDITION: Since LRBs can be throttled down after ignition, it is likely that a FRF will involve firing the LRBs as well as the SSMEs. The simultaneous firing of all engines will result in higher acoustic loads than previously experienced in the vicinity of the launch pad. Acoustic loading may cause damage to the avionics.

HAZARD CAUSE: High acoustic loads imposed on the STA vehicle during FRF

HAZARD EFFECT: Damage to flight hardware

HAZARD LEVEL: Critical

SAFETY REQUIREMENTS: Determine the acoustic loads which may be encountered and design the avionics package to withstand them.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test for reliability demonstration and functional verification.

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-A-007 (LRB-P-A-811)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: A - Avionics

DATE: 5 / 2 / 88

HAZARD TITLE: LRB avionics can cause or be jeopardized by vibration, acoustic loads or shock during separation of the LRB from the STS vehicle.

HAZARDOUS CONDITION: Separation impulse on the avionics package has not yet been defined. In view of the different mass and moments of inertia of the LRBs and the lack of definition of avionics package location, separation impulse may exceed previously established limits. Excessive impulse may damage the avionics package. This hazard is, of course, not applicable to expendable LRBs.

HAZARD CAUSE: Increase in separation impulse imposed on the avionics package

HAZARD EFFECT: Damage to flight hardware

HAZARD LEVEL: Critical

SAFETY REQUIREMENTS: Determine the separation impulse imposed on the avionics package and design avionics to withstand this loading with an adequate safety margin.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test for reliability demonstration and functional verification.

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-A-008 (LRB-P-A-963)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: A - Avionics

DATE: 5 / 2 / 88

HAZARD TITLE: LRB avionics can cause or be jeopardized by computer system malfunction during inspection and test of the LRB and subsystems.

HAZARDOUS CONDITION: Malfunction of computer systems used to test avionics could damage the avionics package and/or allow latent defects to go undetected.

HAZARD CAUSE: Malfunction of computer systems used to test avionics

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Computer systems used for automated testing of avionics, including software, must be designed and thoroughly tested to insure that they operate as intended and are incapable of damaging the avionics. Design the computerized systems to fail safe.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Provides appropriate safety devices

VERIFICATION METHODS: Functional demonstration

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-A-009 (LRB-P-A-971)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: A - Avionics

DATE: 5 / 2 / 88

HAZARD TITLE: LRB avionics can cause or be jeopardized by computer system malfunction during preflight checkout prior to stacking.

HAZARDOUS CONDITION: Due to the differences in configuration between the LRB and SRB, avionics packages are likely to be sufficiently dissimilar that current automated preflight test equipment will require modification or replacement. Program errors in the new or modified equipment, including software errors, could cause damage to the avionics package and/or allow latent defects to go undetected.

HAZARD CAUSE: Malfunction of automated avionics checkout equipment

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Thorough verification of all automated test equipment to be sure it works correctly. Design the checkout equipment to fail safe.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Functional demonstration

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-A-010 (LRB-P-A-975)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: A - Avionics

DATE: 5 / 2 / 88

HAZARD TITLE: LRB avionics can cause or be jeopardized by computer system malfunction during countdown to liftoff or abort.

HAZARDOUS CONDITION: The increased complexity of the LRBs will probably require increased testing and verification by the launch processing sequencer. At present, this system is reaching the point of saturation. Therefore, there is increased probability of computer malfunction, which could either issue an erroneous command, ignore a warning, or allow an out of tolerance condition to go undetected. This may allow launch with a malfunctioning vehicle.

HAZARD CAUSE: Malfunction of launch processing sequencer (LPS)

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Thoroughly evaluate and test the LPS to insure that all functions are appropriate to support the LRB.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Provides appropriate safety devices

VERIFICATION METHODS: Functional demonstration

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-A-011 (LRB-P-A-977)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: A - Avionics

DATE: 5 / 2 / 88

HAZARD TITLE: LRB avionics can cause or be jeopardized by computer system malfunction during nominal flight from liftoff to LRB burnout.

HAZARDOUS CONDITION: At present, there is no requirement for the LRB avionics to be protected from a nuclear event. Since the STS is the principle means of launching satellites requiring manned control, it is likely that the STS could become a military target. A nuclear event could result in complete loss of trajectory information and subsequent loss of the STS vehicle.

HAZARD CAUSE: Malfunction of avionics caused by a nuclear event.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Protect LRB avionics from the effects of a nuclear event.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Qualification testing and verification

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-A-012 (LRB-P-A-979)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: A - Avionics

DATE: 5 / 2 / 88

HAZARD TITLE: LRB avionics can cause or be jeopardized by computer system malfunction during separation of the LRB from the STS vehicle.

HAZARDOUS CONDITION: Currently, the SRB separation cue is reduction of chamber pressure to a level consistent with safe separation. The LRB separation sequence initiation is likely to be a different set of conditions which are dependent upon position and rate information supplied by either the LRB avionics, the Orbiter, ground telemetry, or a combination of these. Malfunction of the computer system providing the separation cues may cause early or late thrust termination and/or LRB separation. This could cause deviation from the planned trajectory. The worst case of assymetric thrust is not considered credible at this time due to the obvious requirement to maintain symmetric thrust at all times.

HAZARD CAUSE: Malfunction of computer system or software error causing early or late thrust termination and/or LRB separation

HAZARD EFFECT: Loss of mission

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design the LRB separation system to fail safe. Use available information from all sources for check and balance and separation cue.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Preflight simulation combined with computer program monitoring in real time during development test flights.

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-A-013 (LRB-P-A-1011)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: A - Avionics

DATE: 5 / 2 / 88

HAZARD TITLE: LRB avionics can cause or be jeopardized by wear during inspection and test of the LRB and subsystems.

HAZARDOUS CONDITION: Rate gyroscope bearings have a finite life. Repeated testing of the LRB with gyros running may exceed the finite life and result in gyro malfunction.

HAZARD CAUSE: Operation of rate gyros in excess of design life.

HAZARD EFFECT: Damage to flight hardware

HAZARD LEVEL: Critical

SAFETY REQUIREMENTS: Design for maximum life plus an adequate safety margin. Consider the use of ring laser gyros or other non-mechanical rate input devices.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Life test program

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-B-001 (LRB-P-B-547)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: B - Booster Separation System

DATE: 3 / 15 / 88

HAZARD TITLE. The booster separation system can cause or be jeopardized by hazardous environments during separation of the LRB from the STS vehicle.

HAZARDOUS CONDITION: The increased dry mass of the LRB baseline vehicle currently requires an additional forward separation booster motor. The increased thrust of this motor will impose increased exhaust plume impingement loading on the ET. At present, no analysis has been accomplished to determine if the ET can withstand this additional loading. This must be verified by analysis and appropriate corrective action taken if thrust loads on the ET from the LRB separation motor plume impingement are excessive.

HAZARD CAUSE: Increased thrust of LRB separation system

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Verify that the ET is capable of withstanding the increased thrust impingement impulse.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-B-002 (LRB-P-B-679)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: B - Booster Separation System

DATE: 3 / 15 / 88

HAZARD TITLE: The booster separation system can cause or be jeopardized by heat sources during flight readiness firing (FRF) of the STS vehicle.

HAZARDOUS CONDITION: Since LRBs can be throttled down after ignition, it is likely that a FRF will involve firing the LRBs as well as the SSMEs. The simultaneous firing of all engines will result in higher heat loads than previously experienced in the vicinity of the launch pad. Heat loading or heat soak into the booster separation motors may damage the motors or, in the extreme case, cause them to ignite.

HAZARD CAUSE: High heat loads imposed on the STS vehicle during FRF.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Either insure that the booster separation system can withstand the added heat load, cool the motors by purging, or do not install them until after all FRF activity is completed.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

1) If the FRF heat load is established and the booster separation system can be shown to be capable of withstanding the heat load, this hazard is eliminated by design.

2) If the booster separation motors are cooled by purging or refrigeration, the hazard will be controlled by appropriate safety devices.

3) If the booster separation motors are not installed until after FRF, this hazard is controlled by effective special procedures.

VERIFICATION METHODS: The heat loads generated by FRF can be calculated by engineering analysis, but will require verification by test. Testing will also be required of the booster separation rocket motors to verify that they can withstand the heating environment. If purging is the control, the system will require verification, both to verify operation of the system and the temperature which it can maintain. If the motors are not installed until after FRF, the verification method would be the operation and maintenance instructions which implement this requirement.

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-B-003 (LRB-P-B-691)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: B - Booster Separation System

DATE: 3 / 15 / 88

HAZARD TITLE: The booster separation system can cause or be jeopardized by heat sources during separation of the LRB from the STS vehicle.

HAZARDOUS CONDITION: The current configuration of the forward separation system adds an additional rocket motor to the cluster used for SRB separation. Photographs of the ET during separation show charring of the TPS on the ET in the area of separation motor plume impingement. The ET TPS is known to be flammable. The added heat load of the extra separation motor may cause unacceptable charring of the ET TPS at separation.

HAZARD CAUSE: Charring of ET TPS by separation motor plume impingement

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Either verify that charring of the ET TPS is acceptable, or delay firing of the fifth motor to reduce heating of the ET TPS to a tolerable level.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-B-004 (LRB-P-B-747)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: B - Booster Separation System

DATE: 3 / 15 / 88

HAZARD TITLE: The booster separation system can cause or be jeopardized by electrical system malfunction during inspection and test of the LRB and subsystems.

HAZARDOUS CONDITION: Sneak circuits, shorts, or other malfunction in any electrical test equipment used to test the LRB could ignite the separation motors after they are installed on the booster vehicle.

HAZARD CAUSE: Ignition of separation motors by malfunctioning checkout equipment

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Disconnect and ground separation motor ignition circuits until all electrical tests are completed. Also insure that all interfacing electronics connected after the ground is removed are incapable of igniting the separation motors except for deliberate ignition at LRB separation.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Provides appropriate safety devices

VERIFICATION METHODS: Mandatory inspection points

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-B-005 (LRB-P-B-760)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: B - Booster Separation System

DATE: 3 / 15 / 88

HAZARD TITLE: The booster separation system can cause or be jeopardized by electrical system malfunction during launch abort activities, including mission postponement (scrub).

HAZARDOUS CONDITION: Currently, the SRB separation motors are armed at a time prior to burnout to allow the drop in chamber pressure below the separation threshold to initiate the separation sequence and fire the separation motors. The separation cues for the liquid rocket booster may be such that during an abort a combination of signals or software-initiated events could arise such that the shutdown of the LRBs would be interpreted as a separation cue. This would fire the separation motors while the vehicle was still on the pad.

HAZARD CAUSE: Sneak circuit or software path which initiates the separation sequence subsequent to an on-pad abort.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design the arming system for the separation system such that the system cannot be armed unless the vehicle has left the pad and gained sufficient altitude that a safe separation is possible.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-B-006 (LRB-P-B-761)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: B - Booster Separation System

DATE: 3 / 15 / 88

HAZARD TITLE: The booster separation system can cause or be jeopardized by electrical system malfunction during nominal flight from liftoff to LRB burnout.

HAZARDOUS CONDITION: Electrical failure in one of the LRBs may disable the booster separation system and prevent separation of the affected booster.

HAZARD CAUSE: Electrical failure which disables one booster separation system

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design the separation system so that separation of one booster automatically causes separation of the other.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-B-007 (LRB-P-B-763)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: B - Booster Separation System

DATE: 3 / 15 / 88

HAZARD TITLE: The booster separation system can cause or be jeopardized by electrical system malfunction during separation of the LRB from the STS vehicle.

HAZARDOUS CONDITION: Electrical failure at separation may cause early or late separation of one booster. The resulting asymmetric thrust/drag could impose unacceptable stresses on the ET, resulting in ET structural failure.

HAZARD CAUSE: Asymmetric thrust caused by electrical failure in one LRB

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Interconnect the LRBs in such a way that other than simultaneous separation is impossible.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-B-008 (LRB-P-B-895)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: B - Booster Separation System

DATE: 3 / 15 / 88

HAZARD TITLE: The booster separation system can cause or be jeopardized by lightning or electromagnetic discharge during flight readiness firing (FRF) of the STS vehicle.

HAZARDOUS CONDITION: The increased length and diameter of the LRB with respect to the SRB puts the booster separation motors closer to the outside of the so-called "cone of protection" of the launch pad. During FRF, the booster separation motors are expected to be installed. A lightning strike on the pad during this time could initiate one or more of these motors, destroying the launch vehicle and pad.

HAZARD CAUSE: Initiation of separation motor(s) due to lightning strike.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Provide additional grounding and lightning protection for the forward end of the LRB during the time that it is on the pad before countdown for launch. A thick aluminum "hat" may be required to protect the uppermost portion of each LRB.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-B-009 (LRB-P-B-901)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: B - Booster Separation System

DATE: 3 / 15 / 88

HAZARD TITLE: The booster separation system can cause or be jeopardized by lightning or electromagnetic discharge during rollout from the VAB and preloading preparation.

HAZARDOUS CONDITION: During rollout, the only lightning protection for the LRB is the LRB itself and the limited protection provided by the ET nose spike. During severe weather, a strike in the vicinity of the booster separation motors is likely. A lightning strike at this time could damage or ignite the separation motors.

HAZARD CAUSE: Lightning strike causing ignition of the separation motors.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Provide additional lightning protection to the LRB. A protective "hat" may be required before launch.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-B-010 (LRB-P-B-903)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: B - Booster Separation System

DATE: 3 / 15 / 88

HAZARD TITLE: The booster separation system can cause or be jeopardized by lightning or electromagnetic discharge during countdown to liftoff or abort.

HAZARDOUS CONDITION: Lightning strike may damage or ignite the booster separation motors while the vehicle is on the pad. Prior to liftoff, any protective devices, such as a "hat" on the nose of the vehicle, would be removed for flight.

HAZARD CAUSE: Lightning strike in the vicinity of the booster separation motors.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Stop the countdown and safe the vehicle when conditions are conducive to lightning strike.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: STS Flight rules

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-B-011 (LRB-P-B-979)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: B - Booster Separation System

DATE: 3 / 16 / 88

HAZARD TITLE: The booster separation system can cause or be jeopardized by computer system malfunction during separation of the LRB from the STS vehicle.

HAZARDOUS CONDITION: Software error in the system which evaluates separation cues and initiates the separation sequence may cause early or late separation of one booster. The resulting asymmetric thrust/drag could impose unacceptable stresses on the ET, resulting in ET structural failure.

HAZARD CAUSE: Asymmetric thrust or drag of LRBs due to software error.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Interconnect the LRBs in such a way that other than simultaneous separation is impossible. (See also LRB-P-B-763).

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-B-012 (LRB-P-B-987)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: B - Booster Separation System

DATE: 3 / 16 / 88

HAZARD TITLE: The booster separation system can cause or be jeopardized by operator error during inspection and test of the LRB and subsystems.

HAZARDOUS CONDITION: Failure of operations and maintenance personnel to safe the separation motors (by Faraday caps, shorting plugs, disconnection of the ignition cables or other means) could allow the separation motors to be ignited by spurious signals or electromagnetic fields.

HAZARD CAUSE: Failure of operator to install safety devices

HAZARD EFFECT: Launch crew injury or death

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Install safety devices so that their correct connection is readily apparent and require that a reliable check be made that the safety device(s) are properly installed prior to any testing. Remove these devices as late as possible before launch.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Operation and maintenance instructions

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-B-013 (LRB-P-B-1001)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: B - Booster Separation System

DATE: 3 / 16 / 88

HAZARD TITLE: The booster separation system can cause or be jeopardized by operator error during nominal flight from liftoff to LRB burnout.

HAZARDOUS CONDITION: The greater complexity of the LRB system as compared to the SRBs will generate the need for more controls and displays. At present, the separation enable switch and separation pushbutton are located on the Orbiter C3 panel. The need for a greater number of switches and displays will require addition to the number of controls and retraining of the pilot and commander to use them. In an emergency, crewmembers trained to reach for SRB controls on the C3 panel may activate the wrong control. This may have catastrophic consequences.

HAZARD CAUSE: Relocation of LRB controls due to limited space on C3 panel

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Consideration must be given to the ergonomic implications of control relocation and grouping, and to the psychology of crew reaction to events requiring early LRB shutdown or off-nominal LRB separation. These considerations should be incorporated into the flight crew retraining program.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Emergency plans and rehearsals

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-B-014 (LRB-P-B-1033)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: B - Booster Separation System

DATE: 3 / 16 / 88

HAZARD TITLE: The booster separation system can cause or be jeopardized by emergencies during component or material purchase, including acquisition of GFP.

HAZARDOUS CONDITION: If the booster separation motors are installed at the manufacturing facility, the most hazardous period will be between the time that they arrive at the facility and the time that the booster manufacturer assumes responsibility for them. During this period, responsibility for protection of the boosters, protection of the facility, guarding against mishandling and other associated responsibilities will be divided. If an emergency involving one or more separation motors were to occur during this period, reaction would be uncoordinated and potentially ineffective.

HAZARD CAUSE: Divided responsibility for handling and storage during transfer of responsibility from separation motor supplier to booster manufacturer

HAZARD EFFECT: Public emergency

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Implement a security and handling plan for all booster pyrotechnics which provides for notification of impending arrival before the separation motors arrive at the installation point as well as unexpected arrival. Coordinate this plan between the Government, the transportation agency, the vehicle supplier, and booster manufacturer, and the security agency at the manufacturing facility. Insure that responsibility is promptly and effectively transferred to the manufacturing agency when the separation motors arrive, and that the motors are immediately and safely transferred to a safe storage location.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Emergency plans and rehearsals

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-B-015 (LRB-P-B-1034)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: B - Booster Separation System

DATE: 3 / 16 / 88

HAZARD TITLE: The booster separation system can cause or be jeopardized by emergencies during manufacture and fabrication of subsystems and components.

HAZARDOUS CONDITION: Historically, catastrophic event plans generally fail to provide effective control of activities following a catastrophic event. This is especially important with regard to a catastrophic event involving a separation motor. Unless exceptional effort is devoted to safety planning and hazard control immediately following a catastophic event involving a separation motor, additional injury or damage may result.

HAZARD CAUSE: Insufficient planning for control of events following a catastrophic event involving a separation motor.

HAZARD EFFECT: Public emergency

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Develop, implement and rehearse a catastrophic event plan which takes appropriate action for every credible event involving a separation motor.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Emergency plans and rehearsals

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-B-016 (LRB-P-B-1041)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: B - Booster Separation System

DATE: 3 / 16 / 88

HAZARD TITLE: The booster separation system can cause or be jeopardized by emergencies during transportation from manufacture to launch site or after recovery.

HAZARDOUS CONDITION: A transportation emergency involving one or more booster separation motors could quickly get out of control. Such a situation could cause injury or damage which, in retrospect, could have been prevented. Currently, transportation of solid rocket motors meets all ICC and DOT requirements, but these may not be sufficient in view of the potentially harmful repercussions of such an event.

HAZARD CAUSE: Insufficient planning for and coordination of control of transportation emergencies

HAZARD EFFECT: Public emergency

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Develop and implement a transportation safety and emergency plan which is coordinated with the carrier, the Government, and state and local emergency preparedness agencies.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Emergency plans and rehearsals

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-C-001 (LRB-P-C-570)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: C - Flight Crew

DATE: 3 / 17 / 88

HAZARD TITLE: The flight crew can cause or be jeopardized by worker overload during intact abort, including RTLS, TAL, AOA and ATO.

HAZARDOUS CONDITION: The greater complexity of the LRB system as compared to the SRBs permits a wider range of options for any emergency. It also will result in more parameters to be measured and more controls and displays to allow crew operation of the entire STS propulsion system to exercise any of the new options permitted. At present, the SSME limit enable and shut down switches, the SRB separation switches and the ET separation switches are all located on the C3 panel in the location to which the pilot or commander would react if there were a need for off-nominal operation. However, there is insufficient room on the C3 panel for the additional LRB controls and displays. This requires the relocation of off-nominal propulsion controls to a different panel. In an emergency, crewmembers trained to reach for the C3 panel controls might be momentarily confused by the new location. Time lost to this confusion or, in the worst case, activation of the wrong control, could jeopardize the success of the abort operation.

HAZARD CAUSE: Crew confusion due to control relocation. (See also hazard number LRB-P-B-1001).

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Consideration must be given to the ergonomic implications of control relocations and grouping, and to the psychology of crew reaction to events requiring early LRB shutdown or off-nominal LRB operation. These considerations should be incorporated into the flight crew retraining program.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Emergency plans and rehearsals

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-C-002 (LRB-P-C-590)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: C - Flight Crew

DATE: 3 / 17 / 88

HAZARD TITLE: The flight crew can cause or be jeopardized by unsafe or unhygienic working conditions during propellant loading for test or flight.

HAZARDOUS CONDITION: Any venting system which could vent harmful effluents toward the Orbiter after a malfunction (e.g. the ET tumble valve) could jeopardize the safety of the crew during crew egress.

HAZARD CAUSE: Unsafe orientation of venting component.

HAZARD EFFECT: Loss of crew

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Insure that there are no venting systems which could allow venting of harmful effluents toward the Orbiter after any credible malfunction.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-C-003 (LRB-P-C-592)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: C - Flight Crew

DATE: 3 / 17 / 88

HAZARD TITLE: The flight crew can cause or be jeopardized by unsafe or unhygienic working conditions during launch abort activities, including mission postponement (scrub).

HAZARDOUS CONDITION: Currently, the greatest heat loading on the pad which can occur with the crew on board is the momentary operation of the SSMEs. Significantly greater heat loads can be expected from a mission abort after momentary firing of the SSMEs and both LRBs prior to shutdown. This heat loading may be so great that it could jeopardize the crew during emergency egress before handrails and other structures had time to cool.

HAZARD CAUSE: Additional heat loading to launch facilities caused by firing of the LRBs prior to a mission abort

HAZARD EFFECT: Loss of crew

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Determine the maximum heat loading which can be experienced by equipment the crew could be expected to use or come in contact with during an emergency escape. If this heat loading is sufficient to injure the crew, modify the pad as necessary (cold water spray, refrigerated handrails, etc.) to provide the necessary protection. In either case, verify that surfaces do not reach unacceptable temperatures by test during development flights.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Provides appropriate safety devices

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-C-004 (LRB-P-C-809)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: C - Flight Crew

DATE: 3 / 17 / 88

HAZARD TITLE: The flight crew can cause or be jeopardized by vibration, acoustic loads or shock during nominal flight from liftoff to LRB burnout.

HAZARDOUS CONDITION: Vibrational loads for the STS incorporating LRBs have not been established. Currently, vibration experienced by the crew approaches the limit of endurance. If LRB vibration is significantly greater than that currently experienced, the crew may be incapacitated or injured.

HAZARD CAUSE: Excessive vibration caused by the LRBs

HAZARD EFFECT: Loss of crew

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design the structure of the LRB to damp out vibration loading on the crew. Verify the design by measurement of vibration/acoustic levels at each crew station during FRF.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-C-005 (LRB-P-C-879)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: C - Flight Crew

DATE: 3 / 17 / 88

HAZARD TITLE: The flight crew can cause or be jeopardized by propellant characteristics and products during countdown to liftoff or abort.

HAZARDOUS CONDITION: The MPS fuel will burn in the presence of an LRB oxidizer and vice versa. Therefore, a leak which would not be hazardous in either of these systems separately could become hazardous if a leak occurred in the other system as well. Such leakage could lead to fire or explosion on the launch pad. At the very least, such leakage would require evacuation of the crew.

HAZARD CAUSE: Leakage of propellant in the presence of an oxidizer during countdown.

HAZARD EFFECT: Loss of mission

HAZARD LEVEL: Critical

SAFETY REQUIREMENTS: Minimize hazards of leakage by minimizing SFP leak points and purging of potential areas of leakage.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Proof test

D ANALYSIS WORKSHEET

RB-P-C-006 (LRB-P-C-999)

hn H. Lindorfer

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r due to increased system complexity

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he launch support crew. Minimize the number of
ns associated with the LRBs.

TED RISK RATIONALE: Minimized by design

gency plans and rehearsals

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-C-007 (LRB-P-C-1001)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: C - Flight Crew

DATE: 3 / 18 / 88

HAZARD TITLE: The flight crew can cause or be jeopardized by operator error during nominal flight from liftoff to LRB burnout.

HAZARDOUS CONDITION: Operator interaction with the various subsystems of the STS, both by the flight crew and launch support crew, is currently approaching the saturation limit. Addition of an additional complex system, such as the LRB, may overtax the ability of the people who interface with this system to interpret and correlate information and make appropriate decisions concerning flight safety.

HAZARD CAUSE: Saturation of the ability of the flight crew to make flight safety decisions.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Consideration must be given to minimization of the requirement for crew reaction during the first few minutes of flight. Flight crew responses and the information on which such responses are based should be available on the ground to permit ground personnel to back up the crew and inform the crew of potentially hazardous situations concerning them. It may also be possible to reduce crew workload by using computer intelligence and maximum use of autonomous systems for LRB control.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-D-001 (LRB-P-D-530)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: D - Parachutes and Recovery Aids

DATE: 4 / 7 / 88

HAZARD TITLE: Parachutes and recovery aids can cause or be jeopardized by hazardous environments during manufacture and fabrication of subsystems and components.

HAZARDOUS CONDITION: Parachute assemblies and other recovery aids on recoverable boosters will likely incorporate pyrotechnic deployment devices. Incorporation of these devices into larger subassemblies may have to be accomplished early in the manufacturing process, making the entire assembly in effect a pyrotechnic assembly. Lack of understanding of or appreciation for the hazards involved in the handling of these assemblies may subject workers to unexpected hazards associated with pyrotechnics or may subject the pyrotechnic devices to hazards such as electromagnetic energy and the like. This hazard is, of course, not applicable to expendable LRBs.

HAZARD CAUSE: Lack of proper care of pyrotechnic assemblies

HAZARD EFFECT: Injury or death to manufacturing personnel

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Assemblies containing pyrotechnic devices must be stored and handled as are other pyrotechnics, including storage in explosive bunkers, observation of safe handling practices, and maintenance of safe distance constraints. Manufacturing personnel must be trained in the handling of pyrotechnic devices and in the requirements of the written safety procedures for handling and packing parachutes with pyrotechnic cutters. For additional safety, a positive safety bar should be bolted over the deployment cap after installation of the pyrotechnic device(s) and removed only during countdown to launch.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Manufacturing process plans

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-D-002 (LRB-P-D-535)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: D - Parachutes and Recovery Aids

DATE: 4 / 7 / 88

HAZARD TITLE: Parachutes and recovery aids can cause or be jeopardized by hazardous environments during flight readiness firing (FRF) of the STS vehicle.

HAZARDOUS CONDITION: Heat loads, vibration, shock and other environmental effects have yet to be defined for the compartment containing recovery aids. Simultaneous firing of 11 engines may impose damaging environments upon the recovery aids. This hazard is, of course, not applicable to expendable LRBs.

HAZARD CAUSE: Hazardous environments imposed during FRF

HAZARD EFFECT: Loss of booster(s)

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: If possible, install dummy packs during on-pad testing, or delete the packs altogether. If this is not feasible, determine by analysis the environmental loads which might be imposed on the recovery aids and design the aids to withstand them. Verify these loads by appropriate instrumentation during FRF.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design or special procedure.

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-D-003 (LRB-P-D-536)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: D - Parachutes and Recovery Aids

DATE: 4 / 7 / 88

HAZARD TITLE: Parachutes and recovery aids can cause or be jeopardized by hazardous environments during preparation for shipment of the booster and ship loose hardware.

HAZARDOUS CONDITION: During preparation for shipment, recovery aids containing pyrotechnic devices must be removed from protective storage and transported to their specialized carriers. While both the storage facility and the specialized carriers may be assumed to provide adequate protection for pyrotechnics, potential hazardous exposure will be greatest during transfer activities. These activities must be planned to reduce hazards associated with exposure of the pyrotechnics to hazardous environments (e.g. electromagnetic radiation) and exposure of personnel closer than the safe distance criteria. This hazard is, of course, not applicable to expendable LRBs.

HAZARD CAUSE: Exposure of pyrotechnic devices to uncontrolled environments and exposure of personnel to pyrotechnic devices

HAZARD EFFECT: Injury or death to manufacturing personnel and damage to flight hardware

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Special handling procedures must be developed and implemented to reduce these hazards to a minimum. It should be noted that explosive cutters submerged in the packed parachute are not considered to be hazardous. The current system, successfully used on the SRB, involves two pull lines through the cutters which are removed at appropriate times during assembly for launch to verify that the cutters are not fired.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Manufacturing process plans

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-D-004 (LRB-P-D-599)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: D - Parachutes and Recovery Aids

DATE: 4 / 7 / 88

HAZARD TITLE: Parachutes and recovery aids can cause or be jeopardized by unsafe or unhygienic working conditions during recovery activities, including towing, and retrieval of recoverables.

HAZARDOUS CONDITION: The requirement to recover nonexpendable boosters imposes a requirement for recovery crews and recovery operations. All of the associated hazards such as rough weather, shipboard malfunction, seasickness and other hazards are not present for expendable boosters. This hazard is, of course, not applicable to expendable LRBs.

HAZARD CAUSE: Requirement to recover nonexpendable boosters (If boosters are not recovered, this hazard is eliminated.)

HAZARD EFFECT: Sickness, injury or death of recovery crews

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: The complete recovery scenario, from recovery ship loading until crew dismissal, must be examined for hazards. These must be minimized by appropriate safety rules, training and rehearsals. With proper safety procedures and training, these hazards should be reduced to a low risk. The risk is lowered if parachutes are cut loose to sink at sea.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Operation and maintenance instructions

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-D-005 (LRB-P-D-644)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: D - Parachutes and Recovery Aids

DATE: 4 / 7 / 88

HAZARD TITLE: Parachutes and recovery aids can cause or be jeopardized by wind during descent from separation to ocean impact.

HAZARDOUS CONDITION: Weather conditions in the LRB impact area which contribute to high pressure or to turbulance will cause false barometric or acceleration inputs, respectively, to deployment sensing devices. This may cause early or late deployment of the parachutes and early disconnection of parachute suspension lines, resulting in damage to the LRBs. This hazard is, of course, not applicable to expendable LRBs.

HAZARD CAUSE: False inputs to deployment cue sensors due to weather anomalies.

HAZARD EFFECT: Loss of LRBs

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Weather at the launch and recovery area should be favorable before committing to launch. It may be possible to design the recovery system for load dispersions induced by 95% of baroswitch response or weather induced variations. If possible, the recovery event should be triggered by a series timer and G-switch which will be unaffected by barometric anomalies.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-D-006 (LRB-P-D-645)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: D - Parachutes and Recovery Aids

DATE: 4 / 7 / 88

HAZARD TITLE: Parachutes and recovery aids can cause or be jeopardized by wind during splashdown events occuring at impact (disposable for expendables).

HAZARDOUS CONDITION: Rough seas in the impact area may impose excessive sea impact loads on the LRBs. Since the structural strength of the booster is driven by flight loads, resolution of this concern by adding strength and weight is not feasible. Excessive sea impact loads may damage LRBs or cause them to sink. This hazard is, of course, not applicable to expendable LRBs.

HAZARD CAUSE: Excessive impact forces on LRBs at splashdown.

HAZARD EFFECT: Loss of booster vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design LRB recovery system to orient the boosters to minimize structural loading at splashdown. It may be possible to design easily replaceable structures required only during flight as sacrificial frangible or crushable shock absorbers. Weather and sea state should be favorable for recovery. Retrorockets can be used to give an impact velocity on the order of 10 feet per second. Hydrodynamic impact attenuation is another possibility being evaluated.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-D-007 (LRB-P-D-646)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: D - Parachutes and Recovery Aids

DATE: 4 / 7 / 88

HAZARD TITLE: Parachutes and recovery aids can cause or be jeopardized by wind during floatation (of recoverable boosters) until recovery.

HAZARDOUS CONDITION: High sea states in the impact area may impose excessive structural loads on boosters awaiting recovery. Since structural strength is driven by flight loads, adding extra strength and weight to resolve this problem is not feasible. This hazard is, of course, not applicable to expendable LRBs.

HAZARD CAUSE: Excessive structural loads caused by high seas

HAZARD EFFECT: Loss of booster vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design the floatation and recovery system to minimize structural loads on the booster vehicle. It may be feasible to make the vehicle neutrally buoyant at some depth below the surface where wave motion is less severe.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-D-008 (LRB-P-D-647)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: D - Parachutes and Recovery Aids

DATE: 4 / 7 / 88

HAZARD TITLE: Parachutes and recovery aids can cause or be jeopardized by wind during recovery activities, including towing, and retrieval of recoverables.

HAZARDOUS CONDITION: High sea states in the recovery area and return routes could impose excessive structural loads on LRBs being recovered or towed. Since structural strength is driven by flight loads, adding strength and weight to resolve this problem is not feasible. This hazard is, of course, not applicable to expendable LRBs.

HAZARD CAUSE: Excessive structural loads due to high seas.

HAZARD EFFECT: Loss of booster vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Means of recovery other than towing should be investigated. Recovery by landing ships (dock) or other specialized vessels may not be out of the question. It may be possible to allow the LRBs to float until acceptable weather conditions prevail.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Emergency plans and rehearsals

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-D-009 (LRB-P-D-679)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: D - Parachutes and Recovery Aids

DATE: 4 / 7 / 88

HAZARD TITLE: Parachutes and recovery aids can cause or be jeopardized by heat sources during flight readiness firing (FRF) of the STS vehicle.

HAZARDOUS CONDITION: Since LRBs can be throttled down after ignition, it is likely that a FRF will involve firing the LRBs as well as the SSMEs. The simultaneous firing of all engines will result in higher heat loads than previously experienced in the vicinity of the launch pad. Heat loading or heat soak into the parachute package may cause damage to the parachute or other recovery aids, such as pyrotechnic deployment devices. These concerns are in addition to those expressed in HAW D-012. This hazard is, of course, not applicable to expendable LRBs.

HAZARD CAUSE: High heat loads imposed on the STS vehicle during FRF.

HAZARD EFFECT: Loss of booster vehicle(s)

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Either design the recovery package to withstand the high heat load, which must then be verified by test, or cool the compartment in which it is located by refrigeration or purging.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-D-010 (LRB-P-D-681)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: D - Parachutes and Recovery Aids

DATE: 4 / 7 / 88

HAZARD TITLE: Parachutes and recovery aids can cause or be jeopardized by heat sources during transportation from manufacture to launch site or after recovery.

HAZARDOUS CONDITION: Parachutes and recovery aids such as floatation devices may be sensitive to heat caused by exposure to solar radiation. The design maximum radiation heating rate may be lower than that experienced by a booster in the sun at the latitude of the Panama Canal. If this is found to be a problem, protection would have to be provided to boosters transported to Vandenberg AFB. This hazard is, of course, not applicable to expendable LRBs.

HAZARD CAUSE: High heat loads due to solar radiation

HAZARD EFFECT: Damage to flight hardware

HAZARD LEVEL: Controlled

SAFETY REQUIREMENTS: This is not considered a credible hazard by Pioneer Systems. There is no problem in adequately shielding, padding or insulating the recovery system components, either in the booster or separately.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Provides appropriate safety devices

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-D-011 (LRB-P-D-686)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: D - Parachutes and Recovery Aids

DATE: 4 / 7 / 88

HAZARD TITLE: Parachutes and recovery aids can cause or be jeopardized by heat sources during propellant loading for test or flight.

HAZARDOUS CONDITION: Previous analyses have determined that cryogenic tanks should be forward of non-cryogenic tanks. Proximity of cryogenic tanks to the parachute compartment could cause freezing of water vapor, purge gas or air in the parachute compartment, freezing or immobilization of deployment aids, or embrittlement and subsequent damage to parachute fabric. This hazard is, of course, not applicable to expendable LRBs.

HAZARD CAUSE: Low temperatures due to proximity of cryogenic tanks

HAZARD EFFECT: Loss of booster vehicle

HAZARD LEVEL: Controlled

SAFETY REQUIREMENTS: Insulate the deployment aid compartment to mitigate the effects of cooling or provide heated purge as necessary. Information from Pioneer Systems indicates that there is no problem in doing this.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-D-012 (LRB-P-D-689)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: D - Parachutes and Recovery Aids

DATE: 4 / 7 / 88

HAZARD TITLE: Parachutes and recovery aids can cause or be jeopardized by heat sources during nominal flight from liftoff to LRB burnout.

HAZARDOUS CONDITION: Heating of the upper portion of the forward cryogenic tank caused by hot ullage gas can cause expansion of entrapped fluids or ice, differential expansion of mechanical (deployment) devices, possible damage to parachute fabric, and possible ignition of pyrotechnic devices. This condition may also be caused by aerodynamic heating, or a combination of aerodynamic heating and heating due to hot ullage gas. This hazard is, of course, not applicable to expendable LRBs.

HAZARD CAUSE: High temperatures caused by hot ullage gas, aerodynamic heating, or both.

HAZARD EFFECT: Loss of booster vehicle

HAZARD LEVEL: Controlled

SAFETY REQUIREMENTS: Insulate compartment as necessary to prevent excessive heat soak into critical components. It should be noted that the recovery system components have no more stringent protection requirements than the other components stowed within the LRB, such as electronic equipment. The SRB parachute system is adequately insulated by the insulation applied to the exterior of the SRB frustrum.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-D-013 (LRB-P-D-691)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: D - Parachutes and Recovery Aids

DATE: 4 / 7 / 88

HAZARD TITLE: Parachutes and recovery aids can cause or be jeopardized by heat sources during separation of the LRB from the STS vehicle.

HAZARDOUS CONDITION: Proximity of separation motors to the parachute compartment may cause excessive heating of the compartment from the hot separation motor cases. This hazard is, of course, not applicable to expendable LRBs.

HAZARD CAUSE: Heat soak into parachute compartment from separation motors

HAZARD EFFECT: Loss of booster vehicle

HAZARD LEVEL: Controlled.

SAFETY REQUIREMENTS: The parachute pack will be protected in the nose cone during flight and separation. Risers from nose to tail would be steel cables under cover. There has been no problem with SRBs which use a similar system.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-D-014 (LRB-P-D-718)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: D - Parachutes and Recovery Aids

DATE: 4 / 7 / 88

HAZARD TITLE: Parachutes and recovery aids can cause or be jeopardized by radiation or sunlight during floatation (of recoverable boosters) until recovery.

HAZARDOUS CONDITION: It has been proposed that parachutes be made of Kevlar™ fabric for strength, resistance to abrasion heating and light weight. Kevlar is known to be degraded by ultraviolet radiation. Several hours of exposure of the parachute material prior to parachute recovery may degrade the fabric. This hazard is, of course, not applicable to expendable LRBs.

HAZARD CAUSE: Degredation of Kevlar fabric due to prolonged exposure to sunlight.

HAZARD EFFECT: Damage to flight hardware

HAZARD LEVEL: Controlled

SAFETY REQUIREMENTS: Current plan is to cut the parachutes loose to sink at sea.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Operation and maintenance instructions

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-D-015 (LRB-P-D-747)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: D - Parachutes and Recovery Aids

DATE: 4 / 7 / 88

HAZARD TITLE: Parachutes and recovery aids can cause or be jeopardized by electrical system malfunction during inspection and test of the LRB and subsystems.

HAZARDOUS CONDITION: Sneak circuits, shorts, or other malfunction in any electrical test equipment used to test the LRB could initiate pyrotechnic recovery deployment devices. This hazard is, of course, not applicable to expendable LRBs.

HAZARD CAUSE: Initiation of pyrotechnics by malfunctioning checkout equipment

HAZARD EFFECT: Loss of boosters

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Disconnect and ground deployment pyrotechnic initiators until all electrical tests are completed. Also insure that all interfacing electronics connected after the ground is removed are incapable of initiating the deployment devices except for deliberate ignition after LRB separation. A red safety bar may be bolted over the deployment hat to prevent accidental deployment. This bar would be removed before flight.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Provides appropriate safety devices

VERIFICATION METHODS: Mandatory inspection points

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-D-016 (LRB-P-D-760)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: D - Parachutes and Recovery Aids

DATE: 4 / 7 / 88

HAZARD TITLE: Parachutes and recovery aids can cause or be jeopardized by electrical system malfunction during launch abort activities, including mission postponement (scrub).

HAZARDOUS CONDITION: Currently, the SRB separation motors are armed at a time prior to burnout to allow the drop in chamber pressure below the separation threshold to initiate the separation sequence and fire the pyrotechnics associated with the separation motors and, later, the parachute deployment devices. The separation cues for the LRB may be such that after engine shutdown after an abort (when all pyrotechnics are presumed to be armed), a combination of signals or software-initiated events could arise such that the shutdown of the LRBs could be interpreted as a separation cue. This could result in initiation of parachute deployment devices while the vehicle is still on the pad. This hazard is also associated with B-760. This hazard is, of course, not applicable to expendable LRBs.

HAZARD CAUSE: Sneak circuit or software path which initiates the separation and recovery sequence subsequent to an on-pad abort.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design the arming system for the parachute deployment system such that the system cannot be armed until after the separation sequence is completed. An appropriate algorithm could not misinterpret shutdown from separation followed by significant free fall and baroswitch closure.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-D-017 (LRB-P-D-762)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: D - Parachutes and Recovery Aids

DATE: 4 / 7 / 88

HAZARD TITLE: Parachutes and recovery aids can cause or be jeopardized by electrical system malfunction during intact abort, including RTLS, TAL, AOA and ATO.

HAZARDOUS CONDITION: During an intact abort, it may be necessary to throttle down the LRBs for a time and then go back to higher thrust, or possibly delay separation. Under these conditions, a combination of signals or software-initiated events could arise such that the anomalous power commands could be interpreted as a parachute deployment cue. This would begin the deployment sequence, with possible loss of the STS vehicle. This is an electronic and software problem unrelated to recovery system components. This hazard is, of course, not applicable to expendable LRBs.

HAZARD CAUSE: Sneak circuit or software path which initiates the separation or parachute deployment sequence subsequent to an in-flight abort.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design the arming system for the parachute deployment system such that the system cannot be armed until the requirement actually exists for parachute deployment.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-D-018 (LRB-P-D-891)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: D - Parachutes and Recovery Aids

DATE: 4 / 7 / 88

HAZARD TITLE: Parachutes and recovery aids can cause or be jeopardized by lightning or electromagnetic discharge during inspection and test of the LRB and subsystems.

HAZARDOUS CONDITION: During testing of the booster vehicle, access panels may be removed which would allow electromagnetic radiation from a nearby lightning strike to induce large currents in unprotected wiring. This may damage electrically operated recovery system components, including electrically initiated pyrotechnics. This hazard is not specific to the parachute or recovery system, but includes all electrical components which may be at risk.

HAZARD CAUSE: Electromagnetic pulse caused by nearby lightning strike.

HAZARD EFFECT: Launch crew injury or death

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Take test conditions into consideration in the design of components to resist damaging electromagnetic effects of nearby lightning strike.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-D-019 (LRB-P-D-894)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: D - Parachutes and Recovery Aids

DATE: 4 / 7 / 88

HAZARD TITLE: Parachutes and recovery aids can cause or be jeopardized by lightning or electromagnetic discharge during test firing of engines and/or the completed booster.

HAZARDOUS CONDITION: If the completed booster is test fired with recovery aid deployment pyrotechnics installed, access openings, test equipment cabling or other non-flight systems may provide a path for excessive currents or electromagnetic energy to damage initiation circuits or, in the worst case, to ignite the pyrotechnics. (See also hazard E-894.) This hazard is, of course, not applicable to expendable LRBs.

HAZARD CAUSE: Non-flight configuration of booster vulnerable to the damaging effects of lightning

HAZARD EFFECT: Possible damage to flight hardware and/or facilities

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Insure that boosters being test fired and associated systems such as instrumentation cables are protected against damage from lightning. It should be noted that the non-flight configuration booster has no requirement for flight ready recovery system components. Recovery components (if any) should be inert or dummy models.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-D-020 (LRB-P-D-908)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: D - Parachutes and Recovery Aids

DATE: 4 / 7 / 88

HAZARD TITLE: Parachutes and recovery aids can cause or be jeopardized by lightning or electromagnetic discharge during descent from separation to ocean impact.

HAZARDOUS CONDITION: During descent, LRB systems will be relatively unprotected by jettisoning of the nose cone to deploy the parachutes. A lightning strike on the booster, especially at the nose, could cause early separation of the suspension system or other damage to the recovery aids such as radar or sonar beacons (if used). This hazard is, of course, not applicable to expendable LRBs.

HAZARD CAUSE: Loss of lightning protection provided by the nose cone

HAZARD EFFECT: Loss of booster

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design booster systems to tolerate the effects of lightning strike with the nose cone removed. It should be noted that the use of recovery aids such as radar or sonar are not now planned. Pyrotechnics used should be tested for insensitivity to lightning or electromagnetic discharge. Damage to recovery aids would not necessarily lead to booster loss.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-D-021 (LRB-P-D-963)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: D - Parachutes and Recovery Aids

DATE: 4 / 7 / 88

HAZARD TITLE: Parachutes and recovery aids can cause or be jeopardized by computer system malfunction during inspection and test of the LRB and subsystems.

HAZARDOUS CONDITION: Malfunction of computer systems used to test the parachute deployment system or other recovery aids could either damage these items or allow latent defects to go undetected. This hazard is, of course, not applicable to expendable LRBs.

HAZARD CAUSE: Malfunction of computer systems used to test parachute deployment systems or recovery aids.

HAZARD EFFECT: Loss of booster

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Computer systems used for automatic testing of recovery systems, including software, must be thoroughly tested to insure that they operate as intended and are incapable of causing damage.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Provides appropriate safety devices

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-E-001 (LRB-P-E-531)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: E - Electrical, Batteries and APU

DATE: 3 / 22 / 88

HAZARD TITLE: The electrical system, batteries or APU can cause or be jeopardized by hazardous environments during inspection and test of the LRB and subsystems.

HAZARDOUS CONDITION: Depending upon the type of batteries employed (if any), batteries could produce hazards by exploding, offgassing of flammable or poisonous gas, or leaking of hazardous electrolyte. These hazards are most likely during testing, before the batteries have demonstrated their reliability and when they are being subjected to higher than normal temperatures and/or current drains. Malfunctioning batteries could cause personnel injury, damage to flight hardware, or environmental pollution.

HAZARD CAUSE: Explosion, offgassing or leaking of malfunctioning batteries.

HAZARD EFFECT: Personnel injury, equipment damage, or pollution.

HAZARD LEVEL: Critical

SAFETY REQUIREMENTS: If batteries are used, specify batteries with proven records of reliability under all types of conditions likely to be encountered. It is preferable to use batteries which fail safe.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-E-002 (LRB-P-E-542)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: E - Electrical, Batteries and APU

DATE: 3 / 22 / 88

HAZARD TITLE: The electrical system, batteries or APU can cause or be jeopardized by hazardous environments during propellant loading for test or flight.

HAZARDOUS CONDITION: Electrical malfunction may cause heating or arcing in areas in which fuel or oxidizer leakage is possible. Such malfunction may be ignition sources for fire or explosion. In many cases, the using of fuses or other protection devices which cut off the flow of current will not be feasible due to the necessity to maintain power on critical systems and the possibility of failure of the current limiting means which would interrupt the current when there was no need to do so. (See also hazard E-686.)

HAZARD CAUSE: Arcing or overheating of electrical circuits without current interruption devices.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design all circuits insofar as possible to be self-limiting with respect to current, and provide generous margins of safety for critical circuits. Insure that electrical conductors and connections do not promote carrying of current by only a few conductors (such as less than the number of available strands in stranded cables). Provide current limiting devices, if possible, which fail by allowing decay of current to a safe level rather than cutting off current to critical circuits. Perform a FMEA on all electrical components to insure that the optimum level of protection is given to all circuits consistent with the operational requirements of the circuits.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-E-003 (LRB-P-E-679)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: E - Electrical, Batteries and APU

DATE: 3 / 23 / 88

HAZARD TITLE: The electrical system, batteries or APU can cause or be jeopardized by heat sources during flight readiness firing (FRF) of the STS vehicle.

HAZARDOUS CONDITION: The heating load during FRF will likely be higher than at any other time. This heat loading may create hot spots which could exceed the maximum allowable temperature of electrical insulation in LRB systems. If tanks are pressurized with hot gas (such as a LOX tank), the ullage gas may exceed the temperature limitations of the wiring insulation inside the tank. This could cause loss of propellant level or temperature information, shorts, or arcing inside the tank. Insulation breakdown inside an oxidizer tank could be a potential source of fire inside the tank with the insulation being the fuel.

HAZARD CAUSE: Electrical insulation breakdown due to heat overload.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Determine maximum heating loads on all electrical circuits and design insulation to withstand these loads.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-E-004 (LRB-P-E-686)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: E - Electrical, Batteries and APU

DATE: 3 / 23 / 88

HAZARD TITLE: The electrical system, batteries or APU can cause or be jeopardized by heat sources during propellant loading for test or flight.

HAZARDOUS CONDITION: If cryogenic propellants or pressurants are used, heat soak from adjacent structures may result in unacceptable cooling of electrical components. This may cause embrittlement and subsequent failure of insulation, condensation in and shorting of electrical connections, unacceptable reduction of battery voltage, or anomalous operation of solid state components. (See also hazard E-542.)

HAZARD CAUSE: Cooling of electrical circuits by cryogenic fluids.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Either:

1) Design all electrical circuits to withstand cooling during loading or

2) Provide heated purge which will provide sufficient heat to protect circuits not only during loading but also during flight.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: This hazard is either:

1) Eliminated by design or

2) Counteracted by special procedures (purging), respectively.

VERIFICATION METHODS: Functional tests to determine minimum acceptable temperature of electrical components and temperatures experienced by these components during propellant loading.

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-E-005 (LRB-P-E-728)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: E - Electrical, Batteries and APU

DATE: 3 / 23 / 88

HAZARD TITLE: The electrical system, batteries or APU can cause or be jeopardized by moisture or precipitation during preparation for shipment of the booster and ship loose hardware.

HAZARDOUS CONDITION: Prior to shipment, the booster will not be configured for flight with all inspection and access ports sealed. Also, the booster will most likely be transported in the horizontal rather than the vertical position it will assume on the launch pad. Drain holes and rain deflection ports will be 90 degrees out of alignment and may allow rainwater to leak into areas which it would not otherwise reach, or from which it would drain out when in the vertical position. If rainwater leaks into electrical components in this attitude, it may cause shorting, corrosion, contamination, or other damage.

HAZARD CAUSE: Improper orientation of rainwater drains during preparation for shipment.

HAZARD EFFECT: Damage to flight hardware

HAZARD LEVEL: Critical

SAFETY REQUIREMENTS: Either provide drain holes to drain rainwater in the horizontal position, or protect the tank from rain or, preferably, both.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: These safety requirements minimize the hazard by design or institute effective special procedures, respectively.

VERIFICATION METHODS: Mandatory inspection points

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-E-006 (LRB-P-E-734)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: E - Electrical, Batteries and APU

DATE: 3 / 23 / 88

HAZARD TITLE: The electrical system, batteries or APU can cause or be jeopardized by moisture or precipitation during propellant loading for test or flight.

HAZARDOUS CONDITION: If cryogenic propellants are used, heat soak from the surrounding structure during propellant loading may cool adjacent electrical wiring and circuits sufficiently to cause freezing of atmospheric moisture on the components. Condensation and freezing may cause shorts, structural stresses on wiring and circuit components, or anomalous operation of integrated circuits.

HAZARD CAUSE: Condensation of atmospheric moisture due to heat soak into cryogenic fluids

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Protection of electronics by purging with warm, dry gas appears to be the most appropriate solution to this problem.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-E-007 (LRB-P-E-737)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: E - Electrical, Batteries and APU

DATE: 3 / 23 / 88

HAZARD TITLE: The electrical system, batteries or APU can cause or be jeopardized by moisture or precipitation during nominal flight from liftoff to LRB burnout.

HAZARDOUS CONDITION: If the LRB is launched through moisture-laden air (including, but not limited to, rain), ram air effects through openings may cause ingestion of large quantities of air from which the moisture may condense inside the vehicle, causing structural stress, electrical malfunction, weight and CG change, and other problems.

HAZARD CAUSE: Ingestion of moisture during flight.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design the booster to minimize or eliminate ram air effects and provide sufficient purge pressure in vented compartments that pressure is higher at the interior of all openings than outside at all times during flight.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Wind tunnel or flight testing may be required.

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-E-008 (LRB-P-E-739)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: E - Electrical, Batteries and APU

DATE: 3 / 23 / 88

HAZARD TITLE: The electrical system, batteries or APU can cause or be jeopardized by moisture or precipitation during separation of the LRB from the STS vehicle.

HAZARDOUS CONDITION: Icing on exposed electrical connectors during propellant loading or flight may cause jamming of the connectors and failure to release when commanded to separate.

HAZARD CAUSE: Failure of electrical connectors to separate caused by icing.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Eliminate icing by:

1) Locating electrical disconnects where they are not subject to icing (even in freezing weather),

2) Surrounding electrical disconnects with warm purge gas,

3) Providing electrical heaters for the electrical disconnects or

4) Provide a means of disconnection which is not imperiled by ice.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Acceptance rationale for the above would be:

1) Elimination by design,

2) Effective special procedures,

3) Provision of safety devices, or

4) Elimination by design.

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-E-009 (LRB-P-E-747)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: E - Electrical, Batteries and APU

DATE: 3 / 23 / 88

HAZARD TITLE: The electrical system, batteries or APU can cause or be jeopardized by electrical system malfunction during inspection and test of the LRB and subsystems.

HAZARDOUS CONDITION: Malfunction in test equipment used to check resistance, continuity and other parameters of the LRB electrical system could impose excessive electrical stresses on components, causing damage. Malfunctioning test equipment could also allow latent defects to go undetected. (See also hazard E-891.)

HAZARD CAUSE: Malfunction of electrical test equipment.

HAZARD EFFECT: Damage to flight hardware

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design or modify test equipment as required to bring it to the same standards of reliability and safety as flight hardware.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-E-010 (LRB-P-E-758)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: E - Electrical, Batteries and APU

DATE: 3 / 23 / 88

HAZARD TITLE: The electrical system, batteries or APU can cause or be jeopardized by electrical system malfunction during propellant loading for test or flight.

HAZARDOUS CONDITION: Electric heaters used to counteract the effects of heat soak into cryogenic propellants can overheat or fail, with consequent damage. Failure of the electrical supply to these heaters may cause freezing of the adjacent structure, resulting in a launch scrub or, in the worst case, damage to the flight vehicle from ice or binding of frozen joints. Overheating of electrical heaters, either due to an internal failure or excessive supply current, could become an ignition source for fire.

HAZARD CAUSE: Failure of electrical heaters or their electrical supply

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design heaters with safety overtemperature interruption and temperature monitoring capability, and design the electrical supply to fail in such a manner that backup power is available and overcurrent is impossible.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-E-011 (LRB-P-E-759)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: E - Electrical, Batteries and APU

DATE: 3 / 23 / 88

HAZARD TITLE: The electrical system, batteries or APU can cause or be jeopardized by electrical system malfunction during countdown to liftoff or abort.

HAZARDOUS CONDITION: Electrical components inside propellant tanks, such as level sensors and associated wiring, can overheat if subjected to excessive current. Overheating of wiring could cause melting of the wiring and insulation and (in the oxidizer tank) fire. Residue from melting or fire inside a propellant tank could become debris which could clog screens, ruin turbopumps, or clog engine injectors.

HAZARD CAUSE: Malfunction of booster electrical system

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design the electrical system with reliable current limiting protection. Measurements based on resistance (which makes a short circuit hazardous) may be replaced with capacitance sensors (which can operate from a constant current source).

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-E-012 (LRB-P-E-761)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: E - Electrical, Batteries and APU

DATE: 3 / 23 / 88

HAZARD TITLE: The electrical system, batteries or APU can cause or be jeopardized by electrical system malfunction during nominal flight from liftoff to LRB burnout.

HAZARDOUS CONDITION: A short circuit or overload during flight may draw sufficient current from the LRB batteries to overheat them. In the case of lithium batteries, this could cause the batteries to explode. Other types of batteries may lose voltage, melt, offgas, or exude electrolyte.

HAZARD CAUSE: Fault in LRB electrical system causing excessive current drain

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design sufficient redundancy into the system that a single fault cannot draw excessive current from any battery, and design the current limiting system to maintain full power with at least one battery disconnected by a current and temperature limiting device.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-E-013 (LRB-P-E-763)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: E - Electrical, Batteries and APU

DATE: 3 / 23 / 88

HAZARD TITLE: The electrical system, batteries or APU can cause or be jeopardized by electrical system malfunction during separation of the LRB from the STS vehicle.

HAZARDOUS CONDITION: Abrupt termination of current through electrical connectors at the moment of separation may cause abnormally high reverse voltages to be generated by the collapsing magnetic field stored in the wiring inductance. This reverse voltage could in the worst case be high enough to cause arcing at the connector, possibly arcing to other (grounded) circuits, causing damage to those circuits and providing an ignition source for venting propellant or TPS. If the arcing involved circuits critical to the recovery aid deployment sequence (for recoverable boosters), the booster could be lost.

HAZARD CAUSE: Abrupt termination of current from separating connectors

HAZARD EFFECT: Loss of booster

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Determine the inductance of all current-carrying circuits which are to be separated, and deadface each circuit at the instant of zero current (for alternating current circuits) or by decay which allows safe voltages at all times. Design each circuit to have zero current before separation, or provide equivalent protection through isolation of the circuit from the separated connector and resistance to ground as required.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-E-014 (LRB-P-E-767)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: E - Electrical, Batteries and APU

DATE: 3 / 23 / 88

HAZARD TITLE: The electrical system, batteries or APU can cause or be jeopardized by electrical system malfunction during recovery activities, including towing, and retrieval of recoverables.

HAZARDOUS CONDITION: If electrical connections are to be made from the recovery ship or barge to the booster, rough seas may cause separation of the circuits involved. If critical functions are to be monitored or controlled, separation of the circuits may cause damage to the booster. This hazard is, of course, not applicable to expendable LRBs.

HAZARD CAUSE: Inadvertent separation of electrical circuits during recovery operations

HAZARD EFFECT: Damage to flight hardware

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design critical functions to be telemetered to and from the recovered booster if these functions are required before the booster is physically loaded onto the recovery vessel. Minimize or, preferably, eliminate any requirement to communicate with the booster until after it is loaded and locked into position aboard the recovery vessel.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-E-015 (LRB-P-E-775)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: E - Electrical, Batteries and APU

DATE: 3 / 23 / 88

HAZARD TITLE: The electrical system, batteries or APU can cause or be jeopardized by differential pressure during flight readiness firing (FRF) of the STS vehicle.

HAZARDOUS CONDITION: Electropneumatic devices such as pressure sensors may have a single barrier between the sensing media and the electrical sensor. Rupture of this barrier would put the media in contact with the electronics. Depending on the media and electronic components employed, barrier rupture could cause false readings, corrosion of electric components, or ignition of the media by heated conductors or arcing within the electronics enclosure.

HAZARD CAUSE: Single barrier failure in electrical transducers containing flammable media or oxidizer.

HAZARD EFFECT: Loss of booster.

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design all sensors such that a single failure cannot allow hazardous media to come into contact with electrical circuits.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-E-016 (LRB-P-E-776)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: E - Electrical, Batteries and APU

DATE: 3 / 24 / 88

HAZARD TITLE: The electrical system, batteries or APU can cause or be jeopardized by differential pressure during preparation for shipment of the booster and ship loose hardware.

HAZARDOUS CONDITION: Electropneumatic pressure sensors which are attached to the booster before propellant loading will experience small pressure changes due to changes in ambient barometric pressure. These changes will cause small movements of the pressure sensing element which may cause wear and possibly contamination in the sensing instrument. This may bias the instrument output or cause it to fail.

HAZARD CAUSE: Small pressure sensor element excursions caused by changes in ambient pressure.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design pressure sensors to withstand an unlimited number of small pressure excursions without failure or degradation.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-E-017 (LRB-P-E-787)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: E - Electrical, Batteries and APU

DATE: 3 / 24 / 88

HAZARD TITLE: The electrical system, batteries or APU can cause or be jeopardized by differential pressure during separation of the LRB from the STS vehicle.

HAZARDOUS CONDITION: Electropneumatic pressure sensors which have a reference port in a location in which it could be pressurized by separation motor exhaust plume impingement may experience a momentary pressurization of the reference port during LRB separation. The effect on the pressure sensing circuit would be a momentary negative pressure reading from tanks or pressure vessels which would virtually never experience negative pressure. Forcing a sensor designed for positive pressures into a negative pressure excursion may damage the sensor. If this sensor is used after separation (such as for parachute deployment), the booster could be lost. This hazard is, of course, not applicable to expendable LRBs.

HAZARD CAUSE: Impingement of separation motor exhaust on pressure sensor reference ports.

HAZARD EFFECT: Loss of booster

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Locate reference ports so that they cannot be pressurized by separation motor exhaust or design the sensors to withstand this condition without damage.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-E-018 (LRB-P-E-798)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: E - Electrical, Batteries and APU

DATE: 3 / 24 / 88

HAZARD TITLE: The electrical system, batteries or APU can cause or be jeopardized by vibration, acoustic loads or shock during test firing of engines and/or the completed booster.

HAZARDOUS CONDITION: The amplitude and frequency distribution of vibration loads on sensors are likely to be different during testing than they are for flight. If sensors with movable elements are used during test firing, vibration loads on the moving parts may cause small excursions ("dither") which could cause wear within the sensor. This wear may result in contamination or sensor bias which would not be apparent during subsequent testing. Sensor bias or failure during flight could cause loss of the vehicle.

HAZARD CAUSE: Dither of moving sensors due to vibrational loads during test.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design all sensors so that dither is not a problem.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-E-019 (LRB-P-E-843)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: E - Electrical, Batteries and APU

DATE: 3 / 24 / 88

HAZARD TITLE: The electrical system, batteries or APU can cause or be jeopardized by leaks during inspection and test of the LRB and subsystems.

HAZARDOUS CONDITION: Testing of LRB electrical systems may be done with temporary batteries installed to simulate flight batteries. These temporary batteries may not be built or tested to flight qualification standards and may therefore be more prone to leakage than flight batteries. Leakage of electrolyte from batteries used for test may cause corrosion or contamination of flight hardware which may be difficult or impossible to detect. In the worst case this could jeopardize safety of flight.

HAZARD CAUSE: Leakage of electrolyte from non-flight batteries during electrical system test.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Use test batteries in which electrolyte leakage is not only unlikely, but is obvious if it occurs. Locate batteries in areas in which leakage or venting is not hazardous. Inspect test batteries after use for signs of leakage. If leakage is detected, inspect surrounding systems as necessary to insure that flight hardware is not damaged, or repair it if it is.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Operation and maintenance instructions

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-E-020 (LRB-P-E-854)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: E - Electrical, Batteries and APU

DATE: 3 / 24 / 88

HAZARD TITLE: The electrical system, batteries or APU can cause or be jeopardized by leaks during propellant loading for test or flight.

HAZARDOUS CONDITION: Propellant level and temperature sensors will probably be inside propellant tanks. This requires that feedthrough connectors be installed in the tanks to allow connection to these devices. Feedthrough connectors are single failure leak points. In addition, penetration of propellant tanks by pressure transducer ports are also single failure leak points. Leakage of propellant could cause corrosion or fire.

HAZARD CAUSE: Penetration of propellant tanks by electrical leads or pneumatic connections to electrical transducers.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design SFP leak ports with redundant seals and backup means of retention of connections to prevent leaks to the maximum extent possible or to limit them if they do occur.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-E-021 (LRB-P-E-857)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: E - Electrical, Batteries and APU

DATE: 3 / 24 / 88

HAZARD TITLE: The electrical system, batteries or APU can cause or be jeopardized by leaks during nominal flight from liftoff to LRB burnout.

HAZARDOUS CONDITION: Leaks, joints or drain holes in cable trays or other locations containing electronic components can allow air to flow along or through electronic assemblies. Ram air at supersonic speeds could create hot spots due to aerodynamic heating which could cause anomalous operation, melting of insulation, shorts, melting of conductors, and/or circuit failure. Hot spots and/or circuit failure could be ignition sources for fire. Anomalous electronic circuit operation could cause loss of the vehicle.

HAZARD CAUSE: Ram air ingested through leakage areas during flight.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design cable tray vents and drains to prohibit unacceptable heating from ram air.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Engineering analysis verified by development flight instrumentation during first flight.

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-E-022 (LRB-P-E-861)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: E - Electrical, Batteries and APU

DATE: 3 / 24 / 88

HAZARD TITLE: The electrical system, batteries or APU can cause or be jeopardized by leaks during splashdown events occuring at impact (disposable for expendables).

HAZARDOUS CONDITION: Leakage of seawater into electronic compartments through leaks, faulty seals or vents installed to equalize pressure could ruin electronic components or assemblies.

HAZARD CAUSE: Leakage of seawater into electronic compartments

HAZARD EFFECT: Damage to flight hardware

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Hermetically seal electronic assemblies which could be damaged by seawater intrusion.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Proof test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-E-023 (LRB-P-E-878)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: E - Electrical, Batteries and APU

DATE: 3 / 24 / 88

HAZARD TITLE: The electrical system, batteries or APU can cause or be jeopardized by propellant characteristics and products during propellant loading for test or flight.

HAZARDOUS CONDITION: Heated electronic components in the presence of atmosphere enriched with oxygen could be subject to degradation of insulation, oxidation of conductors, or ignition of ordinarily non-flammable components.

HAZARD CAUSE: Electronic components in the presence of oxygen from leaks.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Insure that electronic assemblies are sealed or purged to prevent accumulations of oxygen-enriched atmosphere around them.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Proof test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-E-024 (LRB-P-E-890)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: E - Electrical, Batteries and APU

DATE: 3 / 25 / 88

HAZARD TITLE: The electrical system, batteries or APU can cause or be jeopardized by lightning or electromagnetic discharge during manufacture and fabrication of subsystems and components.

HAZARDOUS CONDITION: During fabrication of the LRB and installation of electrical equipment, it may be necessary to move the booster between buildings in a partial state of completion. Electromagnetic pulse from nearby lightning strike may induce damaging currents in the booster electrical system.

HAZARD CAUSE: Currents induced in electrical wiring by nearby lightning strike.

HAZARD EFFECT: Damage to flight hardware

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Move the booster only when thunderstorms are not predicted. If weather begins to deteriorate during a move, return the booster to a safe area. Insure that movement plans are coordinated to allow these contingency procedures to be implemented.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Emergency plans and rehearsals

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-E-025 (LRB-P-E-891)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: E - Electrical, Batteries and APU

DATE: 3 / 25 / 88

HAZARD TITLE: The electrical system, batteries or APU can cause or be jeopardized by lightning or electromagnetic discharge during inspection and test of the LRB and subsystems.

HAZARDOUS CONDITION: Automated test equipment could be damaged by lightning strike to the point that its operation would place unacceptable electrical stresses on the electrical systems being tested or that latent defects could go undetected. (See also hazard E-747.)

HAZARD CAUSE: Malfunction of electrical test equipment due to lightning strike.

HAZARD EFFECT: Damage to flight hardware

HAZARD LEVEL: Critical

SAFETY REQUIREMENTS: Incorporate circuits or subprograms in electrical test equipment which will perform self-diagnostic tests prior to each test of the booster electrical system to insure that the test equipment is working properly.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Provides appropriate safety devices

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-E-026 (LRB-P-E-894)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: E - Electrical, Batteries and APU

DATE: 3 / 25 / 88

HAZARD TITLE: The electrical system, batteries or APU can cause or be jeopardized by lightning or electromagnetic discharge during test firing of engines and/or the completed booster.

HAZARDOUS CONDITION: Access openings, test equipment cabling or other non-flight systems may provide a path for excessive currents or electromagnetic energy to damage electrical equipment. (See also hazard D-894.)

HAZARD CAUSE: Non-flight configuration of booster vulnerable to the damaging effects of lightning.

HAZARD EFFECT: Possible damage to flight hardware and/or facilities.

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Insure that boosters being test fired and associated systems such as instrumentation cables are protected against damage from lightning.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-E-027 (LRB-P-E-895)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: E - Electrical, Batteries and APU

DATE: 3 / 25 / 88

HAZARD TITLE: The electrical system, batteries or APU can cause or be jeopardized by lightning or electromagnetic discharge during flight readiness firing (FRF) of the STS vehicle.

HAZARDOUS CONDITION: Lightning strike on the STS vehicle during the time that the boosters are connected, and especially when they are under power, could induce voltages and currents which could damage electrical equipment directly and other equipment by causing anomalous control signals and instrumentation inputs. These effects are difficult to predict and the adequacy of control measures is difficult to determine due to the unpredictable nature of lightning.

HAZARD CAUSE: Voltages and currents induced by nearby lightning strike.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Do not conduct power on testing, remove the booster or STS vehicle from protective cover, or begin countdown for FRF or launch when the possibility of lightning is predicted. Cease operations and safe the vehicle to the maximum extent possible if unexpected thunderstorms develop.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Operation and maintenance instructions

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-E-028 (LRB-P-E-905)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: E - Electrical, Batteries and APU

DATE: 3 / 25 / 88

HAZARD TITLE: The electrical system, batteries or APU can cause or be jeopardized by lightning or electromagnetic discharge during nominal flight from liftoff to LRB burnout.

HAZARDOUS CONDITION: The exhaust plume from LRB engines may form a conductive path for lightning strike which would otherwise not strike the vehicle. Lightning striking the vehicle will cause high currents in the vicinity of the contact point, which would be near the engines and their controlling electronics. Damage to engine controllers could result in anomalous operation of the engines with possible loss of the vehicle.

HAZARD CAUSE: Lightning strike through the LRB exhaust plume.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: This hazard can only be minimized by design which takes into consideration the possible effects of lightning strike and implements measures to counteract them. This may be done in the case of the engine controllers by heavily shielding, inherently noise immune circuits, redundant wiring, and software self-disgnostics.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-E-029 (LRB-P-E-963)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: E - Electrical, Batteries and APU

DATE: 3 / 25 / 88

HAZARD TITLE: The electrical system, batteries or APU can cause or be jeopardized by computer system malfunction during inspection and test of the LRB and subsystems. (See also hazard E-1035.)

HAZARDOUS CONDITION: Malfunction of computer systems used to test electronic assemblies could either damage electronics or allow latent defects to go undetected.

HAZARD CAUSE: Malfunction of computer systems used to test electronics.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Computer systems used for automated testing of electronics, including software, must be thoroughly tested to insure that' they operate as intended and are incapable of damaging the items or assemblies tested.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Provides appropriate safety devices

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-E-030 (LRB-P-E-967)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: E - Electrical, Batteries and APU

DATE: 3 / 25 / 88

HAZARD TITLE: The electrical system, batteries or APU can cause or be jeopardized by computer system malfunction during flight readiness firing (FRF) of the STS vehicle.

HAZARDOUS CONDITION: Due to the differences in configuration between the LRB and SRB, firing of the LRBs will require significantly greater diagnostic, test and control operations during preparation and countdown. This will require major changes in the launch processing sequencer (LPS) software, software in other associated computer systems, and test equipment. The capability of the LPS now approaches saturation, and LRB requirements may require addition to LPS memory or associated capability. Program and hardware errors in the new or modified equipment, including software errors, could cause damage to the vehicle electrical system or allow undetected errors to occur. Such errors could lead to anomalous operation of the STS vehicle, possibly destroying the vehicle and launch facilities.

HAZARD CAUSE: Program error in the launch processing sequencer or associated systems.

HAZARD EFFECT: Loss of STS vehicle and launch facilities

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Thoroughly test all automated equipment to be sure it works correctly. Use the most advanced software safety and sneak software analyses to insure that there are no software driven events which could jeopardize the crew, vehicle or launch facilities.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Engineering analysis and functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-E-031 (LRB-P-E-977)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: E - Electrical, Batteries and APU

DATE: 3 / 25 / 88

HAZARD TITLE: The electrical system, batteries or APU can cause or be jeopardized by computer system malfunction during nominal flight from liftoff to LRB burnout.

HAZARDOUS CONDITION: The increased complexity of the LRBs will require increased information inputs to and control outputs from the Orbiter general purpose computers (GPCs). Reprogramming or upgrading the GPCs may introduce hardware or software errors which could damage or cause anomalous operation of LRB electronics. Malfunction of LRB electronics could result in loss of the STS vehicle.

HAZARD CAUSE: Hardware or software error in GPCs reprogrammed and/or upgraded to accommodate LRB control requirements.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Thoroughly test all modified hardware and software to insure that it works correctly. Conduct simulation tests to demonstrate correct reaction of the Orbiter to LRB inputs and vice versa.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-E-032 (LRB-P-E-1011)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: E - Electrical, Batteries and APU

DATE: 3 / 25 / 88

HAZARD TITLE: The electrical system, batteries or APU can cause or be jeopardized by wear during inspection and test of the LRB and subsystems.

HAZARDOUS CONDITION: Electrical test equipment contains switches, potentiometers, variable capacitors and inductors, and various electromagnetic or electropneumatic components which involve rotating or sliding contact of one material on another. This inherent wear tends over time to reduce the reliability of these components and causes them eventually to fail. Failure of test equipment may place unacceptable electrical or magnetic stresses on components or circuits under test, or to allow latent defects to go undetected. Generally, the quality and reliability control of test equipment is such that these limited life items are not replaced until they fail, thus making the probability of failure virtually certain.

HAZARD CAUSE: Malfunction of electrical test equipment components (This hazard is associated with hazard E-747.)

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design or modify test equipment as required to bring it to the same standards of reliability and safety as flight hardware. Institute a program of test equipment replacement which reduces to an acceptable level the probability of failure of components. Insure that such components fail safe.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Operation and maintenance instructions

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-E-033 (LRB-P-E-1027)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: E - Electrical, Batteries and APU

DATE: 3 / 25 / 88

HAZARD TITLE: The electrical system, batteries or APU can cause or be jeopardized by wear during separation of the LRB from the STS vehicle.

HAZARDOUS CONDITION: Electrical connectors which have been mated and demated a number of times may experience wear with consequent abrasion of small metallic particles from sliding surfaces such as pins or ferrules. These particles may be immobilized while the connector is mated and would not, in that case, be detectable during test. When the connector separates, these particles could cause shorting between pins or between one or more pins and the grounded shell.

HAZARD CAUSE: Electrical shorts caused by wear particles.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Insure that all circuits which could be endangered by inter-pin (not necessarily adjacent pin) short or short to ground are deadfaced prior to separation.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-E-034 (LRB-P-E-1035)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: E - Electrical, Batteries and APU

DATE: 3 / 25 / 88

HAZARD TITLE: The electrical system, batteries or APU can cause or be jeopardized by emergencies during inspection and test of the LRB and subsystems.

HAZARDOUS CONDITION: Test plans generally provide directions concerning what tests are to be performed and what outputs, readings or indications are expected. Deviations from the expected parameters are treated as unexplained failures, in which case the direction is to leave the test setup undisturbed while troubleshooting activities take place. With a system as complex as the LRB, there may be many failures which could cause progressive damage or result in an unsafe condition. Under these circumstances, quick emergency action would be required; leaving the test setup undisturbed may be hazardous. (See also hazard E-963.)

HAZARD CAUSE: Unexpected failure of test equipment or circuit under test which creates an unsafe condition requiring immediate remedial action.

HAZARD EFFECT: Damage to flight hardware

HAZARD LEVEL: Critical

SAFETY REQUIREMENTS: Examine manufacturing process plans and other test documents to determine failures which could be hazardous and insert direction in each case describing the remedial action to be taken.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Manufacturing process plans

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-E-035 (LRB-P-E-1039)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: E - Electrical, Batteries and APU

DATE: 3 / 25 / 88

HAZARD TITLE: The electrical system, batteries or APU can cause or be jeopardized by emergencies during flight readiness firing (FRF) of the STS vehicle.

HAZARDOUS CONDITION: Current emergency plans at the launch facility deal with potential ignition of an SRB as a condition requiring evacuation of the launch pad, but do not address potential interaction between an ignited SRB and other systems since such a condition is assumed to involve complete destruction of the launch vehicle. In the case of the LRB, conditions which could currently be relatively benign can become more serious when considered as a system interaction. (i.e., leakage of fuel from an LRB in the presence of vented oxygen from the ET.) The potential for hazardous system interaction vastly increases the range and magnitude of potentially hazardous conditions.

HAZARD CAUSE: New hazards created by system interaction.

HAZARD EFFECT: Loss of STS vehicle and/or damage to facilities.

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Conduct a new fault tree analysis of potential prelaunch and test conditions at the launch facility and identify new hazards arising from the potential for hazardous system interaction. This will require examination of fault tree analyses for all systems together. Prepare detailed emergency plans to most effectively handle each emergency.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Emergency plans and rehearsals

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-F-001 (LRB-P-F-535)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: F - Launch Facilities

DATE: 4 / 6 / 88

HAZARD TITLE: Launch facilities can cause or be jeopardized by hazardous environments during flight readiness firing (FRF) of the STS vehicle.

HAZARDOUS CONDITION: Additional thrust, vibration and exhaust heat loads imposed by the LRBs, particularly in the interval between LRB ignition and liftoff, may impose excessive structural or thermal stresses on the launch facility.

HAZARD CAUSE: Excessive stresses caused by LRB ignition

HAZARD EFFECT: Damage to facilities

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Perform a structural stress and thermal analysis on the facility to determine the capability of the facility and supporting systems to withstand the extra load. Modify the facility as necessary.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-F-002 (LRB-P-F-559)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: F - Launch Facilities

DATE: 4 / 6 / 88

HAZARD TITLE: Launch facilities can cause or be jeopardized by worker overload during flight readiness firing (FRF) of the STS vehicle.

HAZARDOUS CONDITION: The increased complexity of the LRB will require a much greater workload to prepare it for launch or FRF than is now required for the SRB. In particular, fueling and final walkdown will impose major requirements on the launch support crew. The effort now required of these personnel approaches the limit of endurance. The imposition of greater responsibilities may cause hazardous worker overload and consequent hazards due to errors in judgement, mistakes, or fatigue.

HAZARD CAUSE: Increased worker load caused by LRB complexity.

HAZARD EFFECT: Launch crew injury or death

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Additional personnel will be required to support each launch or FRF, and additional facilities (consoles, etc.) will also be required. The need for these must be identified early to insure the smooth integration of launch crew function modification into the overall facility modification plan. The number of personnel required must be evaluated in order to determine the optimum number without imparing worker safety.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Emergency plans and rehearsals

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-F-003 (LRB-P-F-588)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: F - Launch Facilities

DATE: 3 / 29 / 88

HAZARD TITLE: Launch facilities can cause or be jeopardized by unsafe or unhygienic working conditions during vehicle stacking, including ancillary test activities.

HAZARDOUS CONDITION: Use of LRBs will require an additional lifting operation in which each LRB is moved into the VAB, raised to the vertical position, and mated to the MLP. There is little space for this operation, and therefore close monitoring and precise control will be required. These constraints may impose hazards associated with suspended or moving loads. It should be noted that this operation is almost identical with the operations now performed when translating the ET to vertical and moving it into the ET checkout cell, or when moving the ET into the VAB integration cell. The number of operations for moving the LRB into the integration cell for mate to the MLP is less than those currently performed for stacking the individual SRB segments on the MLP (1 for LRB versus 5 for the SRB). In effect, this triples the number of operations for translating to vertical (ET + 2 SRB), but reduces time for suspended or moving loads.

HAZARD CAUSE: Hazards associated with suspended or moving loads caused by the requirement to erect the LRB within the VAB.

HAZARD EFFECT: Launch crew injury or death

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: This operation must be reviewed beforehand to determine where personnel need to be stationed, what equipment will be needed, and what industrial hazards may arise.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Operation and maintenance instructions

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-F-004 (LRB-P-F-823)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: F - Launch Facilities

DATE: 4 / 6 / 88

HAZARD TITLE: Launch facilities can cause or be jeopardized by structural loads during flight readiness firing (FRF) of the STS vehicle.

HAZARDOUS CONDITION: The LRB has the capability of going to full rated thrust and then terminating thrust. To exercise this capability on the launch pad will subject the pad to the full thrust of the STS vehicle. The launch pad is not designed for these loads, which may impose unacceptable stresses during FRF.

HAZARD CAUSE: Excess stress caused by STS vehicle going to full rated thrust while attached to the launch pad.

HAZARD EFFECT: Damage to facilities

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: An analysis is required to determine if the pad has sufficient strength and stiffness to withstand additional LRB loads. Areas on which to perform structural stress and thermal analysis are: the MLP, MLP holddown posts, pad area at the MLP holddown post area, the LRB holddown posts, umbilical and carrier plate interfaces, flame deflectors and the flame trench. If analysis indicates that any of these are insufficient, redesign the launch pad with sufficient strength and stiffness to withstand the additional load.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-F-005 (LRB-P-F-943)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: F - Launch Facilities

DATE: 4 / 6 / 88

HAZARD TITLE: Launch facilities can cause or be jeopardized by chemical activity during flight readiness firing (FRF) of the STS vehicle.

HAZARDOUS CONDITION: Use of LOX as the oxidizer for both the ET and LRB will result in increased oxygen venting prior to ignition. Presence of air enriched with oxygen near the launch pad may enhance flammability of materials which currently are not at risk. Heat generated during FRF may cause ignition of otherwise nonflammable materials in the presence of air enriched with vented oxygen. The current baseline has GOX venting to atmosphere near the base of the nose cone of the LRBs.

HAZARD CAUSE: Air enriched with vented oxygen

HAZARD EFFECT: Damage to facilities

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Conduct a study to determine the worst case oxygen concentration as a function of location on the launch facility and venting history. Possible remedial measures are combination of vented oxygen with a fuel gas to produce an innocuous product, extension of GOX vents to allow increased dispersion, or protection of potentially flammable materials. Remedial measures that do not require access arms or venting arms from the existing FSS or additional launch pad towers are preferred.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-F-006 (LRB-P-F-1039)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: F - Launch Facilities

DATE: 4 / 6 / 88

HAZARD TITLE: Launch facilities can cause or be jeopardized by emergencies during flight readiness firing (FRF) of the STS vehicle.

HAZARDOUS CONDITION: The kinds of emergencies which could occur as a result of using LRBs instead of SRBs are sufficiently different that current emergency plans are inadequate to deal with them. Reliance on current emergency plans, equipment, skills and policies could result in an inappropriate response to an emergency condition during fueling, countdown, engine ignition, or static firing.

HAZARD CAUSE: Inadequate plans for emergencies involving LRBs.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Conduct a complete safety analysis of the STS using LRBs to identify those potential emergency conditions not now adequately dealt with by current policies, plans, equipment and skills. Implement new policies, perform necessary planning, identify and procure the necessary equipment and conduct the needed training to deal effectively with these emergencies.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Emergency plans and rehearsals

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-G-001 (LRB-P-G-531)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: G - LRB/Ground Interfaces

DATE: 3 / 30 / 88

HAZARD TITLE: LRB/Ground interfaces can cause or be jeopardized by hazardous environments during inspection and test of the LRB and subsystems.

HAZARDOUS CONDITION: Work platforms, not now required for SRB checkout, will be required for inspection and test of the LRB at the manufacturing facility and at the launch facility. Erection of the platforms, especially those which are assembled inside the tanks or intertanks, could cause damage or personal injury from tripping or falling hazards, dropped components, or other problems associated with assembly, erection or disassembly.

HAZARD CAUSE: Difficulty in assembling, erecting or disassembling work platforms.

HAZARD EFFECT: Launch crew injury or damage to flight hardware.

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design work platforms so that the possibility of personal injury or damage to flight hardware is minimized. Insure that the concept of all hardware is coordinated with the appropriate safety engineering organization prior to actual design. Conduct rehearsals to identify problem areas and modify the platforms as needed before using on flight hardware.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-G-002 (LRB-P-G-532)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: G - LRB/Ground Interfaces

DATE: 3 / 30 / 88

HAZARD TITLE: LRB/Ground interfaces can cause or be jeopardized by hazardous environments during proof test of pressure vessels and structure.

HAZARDOUS CONDITION: Proof test of both fuel and oxidizer tanks are likely to be conducted with pressurized water, possibly with the lower portion of the tank in vacuum to simulate pressure gradients at 3G thrust. If the tanks are designed for stiffness, the thickness of the welds is likely to be greater than the critical flaw size. A critical flaw would then cause the tank to burst without leaking. The result of such a flaw would be a sudden catastrophic rupture of the tank, with consequent release of pressurant. This abrupt flow of pressurant could damage the proof test facility and perhaps pose a hazard to personnel as well.

HAZARD CAUSE: Presence of non-leaking critical flaw in a tank during proof test.

HAZARD EFFECT: Damage to proof test facility and possible injury to personnel.

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design the proof test facility with baffles, weirs, dispersing sumps and other features to break up and contain a sudden release of pressurant without damage. If vacuum pumps are used, design them so that they can safely tolerate sudden inrush of pressurant, or else provide quick acting shutoff valves, activated by sudden rise in pressure, to isolate them from the proof test chamber. Design the chamber so that a ruptured (distorted) tank can be easily removed.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-G-003 (LRB-P-G-637)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: G - LRB/Ground Interfaces

DATE: 3 / 30 / 88

HAZARD TITLE: LRB/Ground interfaces can cause or be jeopardized by wind during rollout from the VAB and preloading preparation.

HAZARDOUS CONDITION: The different geometry of the LRBs from the SRBs will result in different wind loads and resulting loads transferred to the holddown bolts. Although these bolts are designed to withstand bending loads in the -Z direction from the off-center thrust of the SSMEs ("twang effect"), loads in the + or - Y directions may be sufficiently different from those now encountered (with the SRBs) that wind loads must be taken into consideration in the design. Excessive loads may result in unacceptable sway of the STS vehicle, with possible contact with the ET or LRB vent hood(s).

HAZARD CAUSE: Increased load on holddown bolts due to wind loading on the STS vehicle structure.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Conduct an analysis of wind loading to insure that the hazard from wind is negligible. If it is not, redesign the structures adversely impacted to accommodate the greater loads.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-G-004 (LRB-P-G-688)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: G - LRB/Ground Interfaces

DATE: 3 / 30 / 88

HAZARD TITLE: LRB/Ground interfaces can cause or be jeopardized by heat sources during launch abort activities, including mission postponement (scrub).

HAZARDOUS CONDITION: Holddown bolt pyrotechnics will be subjected to intense heating loads as LRB engines are run up to full rated thrust prior to liftoff. If excessive time is spent at this condition prior to release, or if heat soak into the pyrotechnics is excessive, the holddown bolts may be fractured unintentionally. This could cause unintentional release of the STS vehicle or release of only one or more of the bolts, causing excessive stress in the booster skirt and/or the LRB/ET interface. In either case, the STS vehicle could be damaged, either due to unintentional release or excessive loads due to other than simultaneous release of the holddown bolts.

HAZARD CAUSE: Unintentional ignition of holddown bolt pyrotechnics due to heat soak from LRB engine firing.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Conduct an analysis of the thermal stresses on the holddown bolt pyrotechnics and insure adequate safety margins no matter how long the engines fire, within credible limits. If there is reason to suspect that this hazard may be valid, cool the pyrotechnics by purging, water spray, refrigeration, or other means to insure that release is accomplished only when intended.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-G-005 (LRB-P-G-748)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: G - LRB/Ground Interfaces

DATE: 3 / 30 / 88

HAZARD TITLE: LRB/Ground interfaces can cause or be jeopardized by electrical system malfunction during proof test of pressure vessels and structure.

HAZARDOUS CONDITION: Malfunction of the proof test facility electrical system, including malfunction of computer-controlled equipment due to computer error, could impose excessive loads on tanks and other structural elements during proof test. Excessive loads could damage flight hardware and/or the proof test facility.

HAZARD CAUSE: Malfunction of the proof test facility electrical controls.

HAZARD EFFECT: Damage to facilities or flight hardware.

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design the proof load facility with weak points or links, pressure relief devices, or other means by which it is physically impossible to impose excessive loads during proof test.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-G-006 (LRB-P-G-753)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: G - LRB/Ground Interfaces

DATE: 4 / 5 / 88

HAZARD TITLE: LRB/Ground interfaces can cause or be jeopardized by electrical system malfunction during transportation from manufacture to launch site or after recovery.

HAZARDOUS CONDITION: Malfunction of electronics or computer-controlled equipment on the LRB transporter could immobilize the transporter or cause loss of environmental control or monitoring information.

HAZARD CAUSE: Malfunction of the LRB transporter electrical system.

HAZARD EFFECT: Damage to flight hardware

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Provide redundant means of maintaining critical functions on the transporter.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-G-007 (LRB-P-G-759)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: G - LRB/Ground Interfaces

DATE: 3 / 31 / 88

HAZARD TITLE: LRB/Ground interfaces can cause or be jeopardized by electrical system malfunction during countdown to liftoff or abort.

HAZARDOUS CONDITION: Holddown bolts and the umbilical separation bolt are SFPs. Malfunction of the pyrotechnic initiation circuits or of the pyrotechnic separation mechanism could cause damage to the booster(s) at liftoff. If the umbilical separation bolt fails to fire, the umbilical separation plate or the structure to which it is attached could be overloaded. If one or more of the holddown bolts fails to fracture, unacceptable stresses could be placed on the booster holddown structure, possibly resulting in complete structural failure of the booster.

HAZARD CAUSE: Malfunction of the pyrotechnic separation system.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Provide redundant means of firing all pyrotechnics and design the structure to withstand the failure or one or more of the separation bolts.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Engineering analysis followed by functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-G-008 (LRB-P-G-774)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: G - LRB/Ground Interfaces

DATE: 4 / 1 / 88

HAZARD TITLE: LRB/Ground interfaces can cause or be jeopardized by differential pressure during test firing of engines and/or the completed booster.

HAZARDOUS CONDITION: The propulsion inlet pressure to the LRB engines during flight is augmented by the increase in head pressure at 3G acceleration. Conditions on the ground cannot duplicate this condition; it must be simulated by increased ullage pressure in the propellant tanks. The requirement to provide different ullage pressure in the tanks than that which would be required during flight is an anomalous condition which does not exercise the engine/pressure control system under the same conditions which would be encountered in flight. Since this system is not exercised under flight conditions, its proper functioning under flight conditions is still open to some question even after an all systems ground test. In effect, the test would not truly demonstrate the capability of the system to operate satisfactorily in flight.

HAZARD CAUSE: Anomalous pressurization conditions due to inability of ground test conditions to simulate flight.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Develop and implement a testing program which simulates flight conditions on individual components to the extent possible. A test flight of one booster may be required.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-G-009 (LRB-P-G-806)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: G - LRB/Ground Interfaces

DATE: 4 / 1 / 88

HAZARD TITLE: LRB/Ground interfaces can cause or be jeopardized by vibration, acoustic loads or shock during propellant loading for test or flight.

HAZARDOUS CONDITION: With the LOX tank forward, LOX feed to the engines must be through one or two long feedlines. Heat soak into this feedline from the surrounding environment or from warm propellant being supplied during loading may cause a geyser and rupture the feedline.

HAZARD CAUSE: Geysering due to warm LOX being supplied to the LOX tank.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design the propellant delivery system to be incapable of supplying LOX at the interface with the LRB unless the LOX is at a temperature low enough for geysering not to occur. Provide the feedline with sufficient insulation to prevent hazardous heat soak into the line. Provide baffle plates and other geyser protection as necessary.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-G-010 (LRB-P-G-823)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: G - LRB/Ground Interfaces

DATE: 4 / 1 / 88

HAZARD TITLE: LRB/Ground interfaces can cause or be jeopardized by structural loads during flight readiness firing (FRF) of the STS vehicle.

HAZARDOUS CONDITION: Stresses on the holddown bolts at full thrust of all engines may cause one or more bolts to fracture. At the loads applied, loss of tension at one holddown point may impose unacceptable loads on the booster, possibly resulting in complete structural failure. (This hazard is associated with G-688.)

HAZARD CAUSE: Fracture of one or more holddown bolts caused by thrust and vibration.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design the bolts to withstand all stresses. Maintain strict quality controls and perform lot tests which provide high confidence of proper operation. Perform proof tests of bolts to be used to insure that they withstand pre-liftoff loads. Design the holddown structure on the LRB to withstand loss of at least one holddown bolt on each booster.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Proof test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-G-011 (LRB-P-G-988)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: G - LRB/Ground Interfaces

DATE: 4 / 1 / 88

HAZARD TITLE: LRB/Ground interfaces can cause or be jeopardized by operator error during proof test of pressure vessels and structure.

HAZARDOUS CONDITION: Operator error during proof loading could impose excessive loads on tanks and other structural elements during proof test. Excessive loads could damage flight hardware and/or the proof test facility.

HAZARD CAUSE: Operator error during proof test.

HAZARD EFFECT: Damage to facilities or flight hardware

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design the proof load facility with weak points or links, pressure relief devices, or other means by which it is physically impossible to impose excessive loads during proof test.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-G-012 (LRB-P-G-991)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: G - LRB/Ground Interfaces

DATE: 4 / 1 / 88

HAZARD TITLE: LRB/Ground interfaces can cause or be jeopardized by operator error during flight readiness firing (FRF) of the STS vehicle.

HAZARDOUS CONDITION: The increased complexity of the STS with LRBs instead of SRBs will require greater effort to manage countdown operations by both the launch support personnel and the flight crew. Workload of the launch support crew now approaches the limit of endurance. Addition of a system with the complexity of the LRB may overtax the ability of the launch support personnel, especially at the middle management level, adequately to control the loading and operation of the STS vehicle during countdown for test or flight.

HAZARD CAUSE: Launch support crew error due to increased system complexity.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Add operators and layers of management of the launch support activities as necessary to provide a reasonable workload for each individual. Back up operator decisions by artificial intelligence, user-friendly displays, and other labor-saving devices.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Emergency plans and rehearsals

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-H-001 (LRB-P-H-531)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: H - Hazardous Gas Detection System

DATE: 4 / 2 / 88

HAZARD TITLE: The LRB hazardous gas detection system can cause or be jeopardized by hazardous environments during inspection and test of the LRB and subsystems.

HAZARDOUS CONDITION: Fluids used to clean, treat the surface or leak check the HGDS may have a molecular weight similar to that of fumes from leaking RP-1 fuel. In such a case, a test of the HGDS may show a fuel leak when there is none. This may result in wasted inspection time or unnecessary replacement of seals or gaskets in an attempt to repair a leak where none exists. False indications of this type may become common enough that an indication that there is a leak during test could be interpreted as just another false alarm. In such a case, an actual leak might go unrepaired.

HAZARD CAUSE: False indication of leak caused by extraneous fluid in the HGDS sense lines.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Include in the contamination control plan a prohibition against using any fluid in or around the HGDS which might be confused with an RP-1 leak. Thoroughly check the line prior to shipment to insure that there is no indication of fuel leak when the HGDS is operating. Insert these checks in the OMRSD up to propellant loading to guard against the possibility of false indications due to slow leakage through threaded connections.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Operation and maintenance instructions

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-H-002 (LRB-P-H-559)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: H - Hazardous Gas Detection System

DATE: 4 / 2 / 88

HAZARD TITLE: The LRB hazardous gas detection system can cause or be jeopardized by worker overload during flight readiness firing (FRF) of the STS vehicle.

HAZARDOUS CONDITION: Use of the HGDS to additionally monitor leakage from either of the LRBs, as well as monitor for an additional fluid (RP-1) may overtax the current operator capability. This could cause potentially harmful leaks not to be noted, or areas in which there is no leakage to become suspect, or for sources of leakage to be confused with other areas. In the worst case, this could lead to launch commit of a leaking vehicle.

HAZARD CAUSE: Requirement to monitor a greater number of areas for leaks, and potential hazardous leakage of an additional fluid (RP-1).

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Perform a review of HGDS hardware and procedures to identify the need for additional instruments or operators. Implement those procedures found to be needed to insure that potentially hazardous leaks are properly identified and that appropriate corrective action is promptly taken.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Operation and maintenance instructions

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-H-003 (LRB-P-H-734)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: H - Hazardous Gas Detection System

DATE: 4 / 4 / 88

HAZARD TITLE: The LRB hazardous gas detection system can cause or be jeopardized by moisture or precipitation during propellant loading for test or flight.

HAZARDOUS CONDITION: Moisture trapped in the HGDS collection manifold(s) can freeze from the proximity of liquid oxygen, or from ingestion of cold gaseous oxygen from a leak. This would plug the manifold and prevent detection of leaks.

HAZARD CAUSE: Freezing of moisture in the HGDS collection manifold.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Heat the HGDS collection manifolds with electric heaters or warm purge gas. If purge gas is used, determine by test that all parts of the manifolds remain above freezing during all phases of loading, countdown and test firing. Purge the HGDS manifolds with dry gas before using to make sure that all moisture is out of the lines. Prevent moisture intrusion at other times by appropriate seals, plugs or caps.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-H-004 (LRB-P-H-750)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: H - Hazardous Gas Detection System

DATE: 4 / 4 / 88

HAZARD TITLE: The LRB hazardous gas detection system can cause or be jeopardized by electrical system malfunction during test firing of engines and/or the completed booster.

HAZARDOUS CONDITION: Electric heaters used to maintain temperatures of HGDS manifolds above freezing could fail either by runaway temperature increase or by failure to heat at all. If temperatures became too high, the HGDS manifold could become an ignition source for fumes from fuel leakage ingested by the system, or the material of which the manifold was constructed could itself become the fuel during ingestion of leaking oxygen. If temperatures become too low, the manifold could become plugged with liquid purge gas. (See also Hazard # H-734.)

HAZARD CAUSE: Failure of HGDS electric heaters.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: It is preferable that the HGDS manifold be designed to eliminate the need for electric heaters. This can be done by locating the manifolds in areas where they are not subjected to heat soak into cryogenic systems, or insulating the manifolds and/or mounting them on insulated pads which prevent excessively low temperatues in the manifolds. The use of heated purge may also be feasible. If it is absolutely necessary to use electric heaters, they should be provided with temperature indicators and overcurrent protection, as well as redundant heating elements, to minimize this hazard.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-H-005 (LRB-P-H-799)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: H - Hazardous Gas Detection System

DATE: 4 / 5 / 88

HAZARD TITLE: The LRB hazardous gas detection system can cause or be jeopardized by vibration, acoustic loads or shock during flight readiness firing (FRF) of the STS vehicle.

HAZARDOUS CONDITION: Vibration during FRF or at other times can cause loosening of threaded connectors on the HGDS manifold(s), causing leaks at the connections or structural failure at the connectors. Leaks or failure would cause the manifold to ingest gas at other than the design location. This could, in the worst case, lead to inability of the system to detect leakage at the design location and consequent commit to launch of a leaking vehicle.

HAZARD CAUSE: Loosening of HGDS manifold connectors due to vibration.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Minimize the number of connectors in the manifold and design those remaining not to loosen by use of safety wire or other acceptable means.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Mandatory inspection points

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-H-006 (LRB-P-H-871)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: H - Hazardous Gas Detection System

DATE: 4 / 4 / 88

HAZARD TITLE: The LRB hazardous gas detection system can cause or be jeopardized by propellant characteristics and products during flight readiness firing (FRF) of the STS vehicle.

HAZARDOUS CONDITION: The facility hazardous gas detection instrument is a mass spectrometer which is currently configured to detect molecules of low molecular weight (hydrogen, helium, oxygen, nitrogen). Attempting to use this instrumentation to detect RP-1 and its constituent molecules of higher molecular weight may jeopardize the sensitivity and accuracy of the system. If this is the case, leakage of RP-1 may go undetected.

HAZARD CAUSE: Use of instrumentation configured for light weight molecules to detect the heavier molecules of RP-1.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Adjust or, if necessary, replace the mass spectrometer so that the new configuration can detect leaks of RP-1 to the precision and sensitivity necessary. Test this configuration by deliberately introducing leaks prior to actual use to insure that the system works as required.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-H-007 (LRB-P-H-902)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: H - Hazardous Gas Detection System

DATE: 4 / 4 / 88

HAZARD TITLE: The LRB hazardous gas detection system can cause or be jeopardized by lightning or electromagnetic discharge during propellant loading for test or flight.

HAZARDOUS CONDITION: Movement of RP-1 volatile fractions through the HGDS may generate sufficient static electricity to serve as an ignition source. If this electricity is discharged, it may cause a fire or explosion within the HGDS manifold. A grounded metallic line from the booster vehicle to the facility ground may conduct currents generated by lightning strike with sufficient energy to produce an ignition source through ohmic or inductive heating. This could cause ignition of the RP-1 fumes and destruction of the vehicle.

HAZARD CAUSE: Static discharge or induced currents in the presence of RP-1 fumes.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design the HGDS to eliminate the buildup of static electricity or heating from currents induced by lightning.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-I-001 (LRB-P-I-530)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: I - LRB/ET Interfaces

DATE: 4 / 29 / 88

HAZARD TITLE: LRB/ET interfaces can cause or be jeopardized by hazardous environments during manufacture and fabrication of subsystems and components.

HAZARDOUS CONDITION: LRB/ET attach fittings are likely to be made of titanium. The most likely method of fabrication is to cast the metal to the rough shape and then machine close tolerance surfaces. Titanium chips or turnings are essentially indistinguishable from aluminum to the average person. Therefore the possibility exists that titanium scrap could be mixed with aluminum scrap. This could pose a hazard to facilities used to melt the aluminum scrap during recycling.

HAZARD CAUSE: Mixing of titanium scrap with aluminum

HAZARD EFFECT: Damage to facilities

HAZARD LEVEL: Critical

SAFETY REQUIREMENTS: Segregate machining operations involving titanium from other machining operations and impose control measures which will, among other things, require titanium scrap to be removed from the machining area before the end of each shift. Use specially marked containers for titanium scrap and provide these containers with locked lids which can be opened only by those who clean up and dispose of titanium scrap.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Manufacturing process plans

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-I-002 (LRB-P-I-535)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: I - LRB/ET Interfaces

DATE: 4 / 5 / 88

HAZARD TITLE: LRB/ET interfaces can cause or be jeopardized by hazardous environments during flight readiness firing (FRF) of the STS vehicle.

HAZARDOUS CONDITION: During FRF, hot ullage gas will cause the LOX tank to expand. This will increase the distance between the forward and aft attach points between the ET and LRB. In addition, the thrust loads will be opposite to those encountered in flight, i.e. the forward thrust fitting will be in tension instead of compression. The ET is currently designed to accommodate the tension loads and expansion of the booster, but not both together, since the SRB does not expand appreciably during FRF. This combination of stress and strain may place additional stresses on the ET which it was not designed to tolerate. The result of these stresses may be structural failure of the ET/LRB (ET/SRB) attach fittings.

HAZARD CAUSE: Combinations of stress and strain during FRF for which the ET has not been designed.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Perform an engineering study of the maximum combinations of stress and strain which could be encountered by the ET/LRB interfaces, and determine if the current design of the ET can accommodate them. If not, either design the LRB attach fittings to protect the ET, or else redesign the ET attach fittings to accommodate the new loads.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-I-003 (LRB-P-I-542)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: I - LRB/ET Interfaces

DATE: 4 / 29 / 88

HAZARD TITLE: LRB/ET interfaces can cause or be jeopardized by hazardous environments during propellant loading for test or flight.

HAZARDOUS CONDITION: The lower attachment fittings of the LRB may be made of titanium to reduce weight. TPS will probably not be required on titanium fittings. These fittings are in an area in which liquid air, condensed from surfaces cooled by liquid hydrogen in the ET or liquid helium in the LRB, could impact the titanium fittings. Titanium is known to be sensitive to ignition by impact of liquid air. This condition could cause ignition of the titanium with resulting fire on the vehicle.

HAZARD CAUSE: Impact of dripping liquid air onto bare titanium fittings.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Protect fittings by fairings or TPS to prevent liquid air from impacting bare titanium.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-I-003 (LRB-P-I-542)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: I - LRB/ET Interfaces

DATE: 4 / 29 / 88

HAZARD TITLE: LRB/ET interfaces can cause or be jeopardized by hazardous environments during propellant loading for test or flight.

HAZARDOUS CONDITION: The lower attachment fittings of the LRB may be made of titanium to reduce weight. TPS will probably not be required on titanium fittings. These fittings are in an area in which liquid air, condensed from surfaces cooled by liquid hydrogen in the ET or liquid helium in the LRB, could impact the titanium fittings. Titanium is known to be sensitive to ignition by impact of liquid air. This condition could cause ignition of the titanium with resulting fire on the vehicle.

HAZARD CAUSE: Impact of dripping liquid air onto bare titanium fittings.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Protect fittings by fairings or TPS to prevent liquid air from impacting bare titanium.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-I-004 (LRB-P-I-543)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: I - LRB/ET Interfaces

DATE: 4 / 29 / 88

HAZARD TITLE: LRB/ET interfaces can cause or be jeopardized by hazardous environments during countdown to liftoff or abort.

HAZARDOUS CONDITION: The current baseline configuration shows the LOX/GOX vent to atmosphere near the base of the nose cone of the LRBs. ET TPS is flammable and not GOX compatible and is known to support combustion in 25% oxygen. The presence of vented oxygen in the vicinity of the ET during the time that it is subjected to high heat loading from simultaneous firing of all engines just prior to liftoff may cause the TPS to ignite and burn.

HAZARD CAUSE: Vented oxygen in the presence of ET TPS

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design the GOX vents to vent away from the ET.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-I-005 (LRB-P-I-545)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: I - LRB/ET Interfaces

DATE: 4 / 29 / 88

HAZARD TITLE: LRB/ET interfaces can cause or be jeopardized by hazardous environments during nominal flight from liftoff to LRB burnout.

HAZARDOUS CONDITION: The current baseline configuration shows the LOX/GOX vent to atmosphere near the base of the nose cone of the LRBs. ET TPS is flammable and not GOX compatible and is known to support combustion in 25% oxygen. The presence of vented oxygen in the vicinity of the ET during flight, when this area is subjected to aerodynamic heating, may cause the TPS to ignite and burn.

HAZARD CAUSE: Vented oxygen in the presence of ET TPS

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design the GOX vents to vent away from the ET.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-I-006 (LRB-P-I-579)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: I - LRB/ET Interfaces

DATE: 4 / 6 / 88

HAZARD TITLE: LRB/ET interfaces can cause or be jeopardized by unsafe or unhygienic working conditions during inspection and test of the LRB and subsystems.

HAZARDOUS CONDITION: The increased complexity of the LRBs will result in a correspondingly greater need for inspection and testing during all phases of preflight preparation. This will require increased access, perhaps in areas which are not now accessible on the fully assembled SRB. In such areas, a requirement for workers to squeeze into tight spaces, perform awkward movements, or otherwise depart from optimum ergonomic considerations may result in worker injury.

HAZARD CAUSE: Requirements for workspaces to conform to the space available in and around the LRB.

HAZARD EFFECT: Launch crew injury or death

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: All inspection and test operations required by the use of LRBs on the STS must be reviewed to determine the potential hazards to inspection and test personnel. The LRB must be designed with the requirements for inspection and test in mind. Where hazards to workers cannot be designed out of the LRB, they must be minimized in accordance with the hazard reduction precedence sequence of NHB 5300.4 (1D-2). The human engineering considerations of MIL-STD-1472 (Rev C) should be complied with. Where necessary, appropriate tools must be designed to alleviate hazards where this can be done. Special procedures and sequences of activities must be worked out beforehand to prevent worker injury.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Certificates of training

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-I-007 (LRB-P-I-753)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: I - LRB/ET Interfaces

DATE: 4 / 29 / 88

HAZARD TITLE: LRB/ET interfaces can cause or be jeopardized by electrical system malfunction during transportation from manufacture to launch site or after recovery.

HAZARDOUS CONDITION: Since most of the critical electrical functions of the LRB will require monitoring during flight, it is reasonable to assume that the electrical connections required for monitoring will be connected to the Orbiter through the Orbiter/LRB electrical connectors. If these functions are monitored on the ground, they will be connected to monitoring or recording equipment associated with the transporter. An electrical malfunction on the transporter could cause loss of critical monitoring information or, in the worst case, damage the LRB by overload of its electrical systems or components. NOTE - This hazard is not credible if there is no electrical connection to the LRB during transportation.

HAZARD CAUSE: Malfunction of transporter electrical system.

HAZARD EFFECT: Damage to flight hardware

HAZARD LEVEL: Critical

SAFETY REQUIREMENTS: Design whatever monitoring equipment is used with sufficient redundancy to reduce this risk to an acceptable level, and include fuses, circuit breakers, or other protective devices to prevent overload (excessive, voltage or current, anomalous frequencies or anomalous impedence, etc.) of electrical circuits. If electrical controls on the transporter control other functions critical to the safety of the LRB, these also must be protected.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-I-008 (LRB-P-I-908)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: I - LRB/ET Interfaces

DATE: 4 / 7 / 88

HAZARD TITLE: LRB/ET interfaces can cause or be jeopardized by lightning or electromagnetic discharge during descent from separation to ocean impact.

HAZARDOUS CONDITION: Circuits routed through the LRB/ET interface will be isolated from ground at the connector pins. Accumulation of static charge by the LRB during descent will put the structure at a different potential from these circuits. This potential could become great enough to cause damage to the circuits involved from overvoltage or arcing. This hazard is, of course, not applicable to expendable LRBs.

HAZARD CAUSE: Isolation of circuits from structural ground with connector pins exposed during descent.

HAZARD EFFECT: Damage to flight hardware

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design the electronics so that critical circuits are grounded after LRB separation or otherwise protected from the effects of static charge buildup.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-J-001 (LRB-P-J-679)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: J - ET and Components

DATE: 4 / 8 / 88

HAZARD TITLE: The ET and components can cause or be jeopardized by heat sources during flight readiness firing (FRF) of the STS vehicle.

HAZARDOUS CONDITION: With both SSME and LRB engines firing, the heat load in the vicinity of the ET LH2 tank aft dome will be much greater than with only the SSMEs firing, which is currently the condition during FRF. The ET has not been designed to withstand these increased loads. Therefore, the possibility exists that during FRF the ET TPS will be excessively charred or ablated, and will not be flightworthy. In the worst case, the TPS could be burned off or damaged to the point that the hydrogen fuel would be warmed at the intake siphon. In that case, there is danger of the SSME pumps cavitating, which would destroy the engine(s) and the STS vehicle.

HAZARD CAUSE: Increased heat load on the ET from LRB engines.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Perform a thermal loading analysis to determine if the ET TPS can safely withstand the added heat load. If not, either increase the ET TPS or protect the ET with an insulated reflective cover during FRF.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Provides appropriate safety devices

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-J-002 (LRB-P-J-799)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: J - ET and Components

DATE: 4 / 8 / 88

HAZARD TITLE: The ET and components can cause or be jeopardized by vibration, acoustic loads or shock during flight readiness firing (FRF) of the STS vehicle.

HAZARDOUS CONDITION: Vibration loads from the LRBs have not yet been defined. Vibration, especially from pump-fed engines, could resonate with a harmonic of some as yet unknown natural frequency of vibration of the ET. This situation could cause structural failure of the ET.

HAZARD CAUSE: Generation of an ET resonant frequency by the LRBs.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: The proposed ground vibration test should discover any conditions in which the LRBs generate vibration which resonates with the ET. If this condition is discovered, remedial measures could either prevent the specific frequencies of interest being generated, or else could damp out positive feedback to protect the ET.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Ground vibration test.

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-K-001 (LRB-P-K-530)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: K - Cryogenic Tanks and Systems

DATE: 5 / 3 / 88

HAZARD TITLE: Cryogenic tanks and systems can cause or be jeopardized by hazardous environments during manufacture and fabrication of subsystems and components.

HAZARDOUS CONDITION: Carbon fibers used to produce filament wound tanks generate carbon dust or "fly" during winding. This carbon fly is conductive, and can cause short circuits in electrical circuits. In addition, carbon fibers can cause dermatitis. The matrix used to bind the fibers can cause various forms of irritation in sensitized individuals. If filament wound tanks are used for helium storage, this hazard must be taken into consideration in the design of the facility used to manufacture them. This hazard does not apply, of course, if filament wound tanks are not used.

HAZARD CAUSE: Use of carbon fibers in a toxic matrix

HAZARD EFFECT: Environmental pollution

HAZARD LEVEL: Critical

SAFETY REQUIREMENTS: The precise nature of the remedial measures to be taken to resolve hazards associated with the manufacture of filament wound tanks will depend upon the type of equipment used and the matrix employed. In general, manufacture of filament wound tanks should take place in a separate facility specifically designed for the purpose. To protect against carbon fly, the facility would be required to have sealed electrical equipment and ventilation and filtering systems which would remove the fly from the air. Personnel sensitization can be reduced by reduced exposure, which may include the use of air curtains or personal protective equipment. Some individuals may be sensitized in spite of these measures, and would not be able to work in the facility. These precautions will apply in any case, but they would not have to be taken by the LRB manufacturer if tanks are purchased from an outside vendor. In such a case, the vendor would assume the burden of preventing hazards to his personnel or environmental pollution.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Provides appropriate personal protective equipment

VERIFICATION METHODS: Manufacturing process plans

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-K-002 (LRB-P-K-579)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: K - Cryogenic Tanks and Systems

DATE: 4 / 10 / 88

HAZARD TITLE: Cryogenic tanks and systems can cause or be jeopardized by unsafe or unhygienic working conditions during inspection and test of the LRB and subsystems.

HAZARDOUS CONDITION: Any test of cryogenic systems involving close personnel proximity to cryogens involves the potential for cryogenic burns. In addition, vaporization of cryogenic oxygen will produce a hazardous environment in which materials not normally considered flammable will burn, and all flammable materials will burn more vigorously. Leakage of cryogenic helium can produce an atmosphere which is incapable of supporting respiration and which is undetectable to the human senses.

HAZARD CAUSE: Cold temperature of cryogens, oxidizing capability of oxygen and inability of helium to support respiration.

HAZARD EFFECT: Launch crew injury or death

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Persons working around the LRB or any of its subsystems when cryogens are aboard should wear full body protection. In proximity to systems containing cryogenic oxygen, clothing must be free of dirt, grease, fuel spills, or reducing agents. Clothing made of beta cloth is preferred because of its inability to burn. When helium is present, self contained breathing apparatus must be worn. No personnel should be allowed to work alone around cryogens, but must always be under constant observation by at least one other person physically separated so that the risk of one accident involving both persons is small. The observer should never enter an enclosed space with the person being observed, but should monitor from outside the enclosure. Persons working with helium should be in constant audio communication over a two-way radio or telephone line, and should speak often enough that the characteristic "Donald Duck" voice which results from speaking with helium in the lungs can be heard in sufficient time for the affected individual to escape or be rescued. Procedures should be written to implement these and other safety measures found appropriate.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures and provides appropriate personal protective equipment

VERIFICATION METHODS: Operation and maintenance instructions

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-K-003 (LRB-P-K-650)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: K - Cryogenic Tanks and Systems

DATE: 4 / 10 / 88

HAZARD TITLE: Cryogenic tanks and systems can cause or be jeopardized by contamination during manufacture and fabrication of subsystems and components.

HAZARDOUS CONDITION: Materials and fluids used during the manufacturing process can leave particles or residue which could react chemically with the cryogens or could condense or form nuclei for condensation of particles large enough to block screens, clog small orifices, or damage the engines or propulsion system.

HAZARD CAUSE: Particles or residue left in the tank during the manufacturing process.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Thoroughly wash the tank interiors after manufacturing and monitor the effluent to insure that the tanks are clean. Do not use any fluids in the tanks which are incompatible with the media to be stored. Particular attention should be paid to the helium tank(s) due to the low storage temperature of supercritical helium.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Mandatory inspection points

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-K-004 (LRB-P-K-674)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: K - Cryogenic Tanks and Systems

DATE: 4 / 10 / 88

HAZARD TITLE: Cryogenic tanks and systems can cause or be jeopardized by heat sources during manufacture and fabrication of subsystems and components.

HAZARDOUS CONDITION: Heat applied during welding, especially by weld repairs, could change the temper of metallic tanks sufficiently to change the temper from design specifications. Improper temper could adversely affect the fracture toughness of the metal at cryogenic temperatures.

HAZARD CAUSE: Heat applied during welding

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Welding specifications must be rigidly controlled. Sufficient inspection steps must be implemented to insure that tanks are welded according to specification.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Mandatory inspection points

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-K-005 (LRB-P-K-679)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: K - Cryogenic Tanks and Systems

DATE: 4 / 10 / 88

HAZARD TITLE: Cryogenic tanks and systems can cause or be jeopardized by heat sources during flight readiness firing (FRF) of the STS vehicle.

HAZARDOUS CONDITION: The heating environment during FRF is likely to be the highest heat load experienced by the boosters. Heat soak into cryogenic systems could cause overpressure and tank rupture, especially in the case of supercritical helium.

HAZARD CAUSE: Heat soak into cryogenic systems during FRF

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: All cryogenic systems should be designed for the FRF heat load as well as flight. Where the FRF heat load is higher and designing for this condition is impractical due to weight restrictions, protective wrapping or blankets for the cryogenic systems should be considered.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: This hazard can either be eliminated by design or can provide appropriate safety devices.

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-K-006 (LRB-P-K-694)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: K - Cryogenic Tanks and Systems

DATE: 5 / 3 / 88

HAZARD TITLE: Cryogenic tanks and systems can cause or be jeopardized by heat sources during floatation (of recoverable boosters) until recovery.

HAZARDOUS CONDITION: The combination of cryogenic tanks being surrounded by the high heat conductivity of seawater and the erosion or ablation of the TPS (if any) during flight could produce massive icing on the outside of the tanks. The tensile strength of the ice band may be great enough to cause crushing of the tank as the ice contracts after forming. This hazard is, of course, not applicable if boosters are not recoverable.

HAZARD CAUSE: Formation of ice around cryogenic systems immersed in seawater.

HAZARD EFFECT: Damage to flight hardware

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design recoverable boosters to the conditions of propellant residuals, tank temperature after splashdown, tank strength and TPS thickness so that they can withstand the conditions likely to be encountered during floatation.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-K-007 (LRB-P-K-734)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: K - Cryogenic Tanks and Systems

DATE: 4 / 11 / 88

HAZARD TITLE: Cryogenic tanks and systems can cause or be jeopardized by moisture or precipitation during propellant loading for test or flight.

HAZARDOUS CONDITION: Heat soak from structures cooled by liquid oxygen or liquid helium could cause ice from atmospheric moisture to collect and solidify in enclosed spaces, vents or drain holes. This ice could consist partially of solid components of air or nitrogen purge gas in the case of the helium tank. Continued cooling of ice in the crotch area at the forward end of the oxygen tank could cause constriction of the dome at the dome to barrel junction, possibly causing structural failure. See also hazards D-686, E-734 and H-734.

HAZARD CAUSE: Condensation of atmospheric moisture adjacent to LOX or supercritical helium containers.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Insulate cryogenic tanks, provide heated purge, use electric heaters, or employ a combination of these methods to prevent accumulation of ice in places where it could cause a hazard.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-K-008 (LRB-P-K-735)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: K - Cryogenic Tanks and Systems

DATE: 4 / 11 / 88

HAZARD TITLE: Cryogenic tanks and systems can cause or be jeopardized by moisture or precipitation during countdown to liftoff or abort.

HAZARDOUS CONDITION: Ice forming on the outside of the booster as the result of condensation on the LOX tank can be a hazardous debris source. Ice shed from the booster during liftoff can damage the Orbiter wing tiles or ET TPS. Ice chips blown about by the exhaust plumes of the engines can cause damage to the STS or the launch facility.

HAZARD CAUSE: Condensation of atmospheric moisture on the LOX tank.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Provide sufficient TPS on the LOX tank to prevent icing. For protuberances on which TPS is impractical, use thermal isolators and/or electric heaters to prevent icing.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-K-009 (LRB-P-K-776)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: K - Cryogenic Tanks and Systems

DATE: 4 / 12 / 88

HAZARD TITLE: Cryogenic tanks and systems can cause or be jeopardized by differential pressure during preparation for shipment of the booster and ship loose hardware.

HAZARDOUS CONDITION: Boosters will probably be shipped pressurized to prevent intrusion of moisture or contamination and to insure that pressure transducers are biased to an off-nominal condition to prevent wear at critical portions of the wiper arc. If pressurization is losed, the tanks could be contaminated or the pressure transducers could remain in the zero pressure range.

HAZARD CAUSE: Loss of pressure during transportation or storage.

HAZARD EFFECT: Damage to flight hardware

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Either design all components to allow the booster to be shipped with zero internal pressure with appropriate breathers or provide redundant pressurization means on the transporter with a low pressure alarm or automatic repressurization.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: This hazard may be resolved either by eliminating it by design or by providing appropriate safety and warning devices.

VERIFICATION METHODS: Operation and maintenance instructions

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-K-010 (LRB-P-K-782)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: K - Cryogenic Tanks and Systems

DATE: 4 / 12 / 88

HAZARD TITLE: Cryogenic tanks and systems can cause or be jeopardized by differential pressure during propellant loading for test or flight.

HAZARDOUS CONDITION: Icing of vents from cryogenic containers or failure of valves in venting systems could block venting of the tank. This could cause bursting of the tank as cryogens boil during chilldown or loading.

HAZARD CAUSE: Blockage of cryogenic tank vents by ice or valve malfunction.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Provide heated purge or electric heat for vent valves. Design valves in the venting system so that the probability of failure is low. Provide relief in the form of burst disks or weak points in the tank which will fail due to overpressure without jeopardizing the capability of the tank to support the loaded ET and Orbiter.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-K-011 (LRB-P-K-788)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: K - Cryogenic Tanks and Systems

DATE: 5 / 3 / 88

HAZARD TITLE: Cryogenic tanks and systems can cause or be jeopardized by differential pressure during descent from separation to ocean impact.

HAZARDOUS CONDITION: Venting of residual oxygen due to boiloff within the oxygen tank after booster separation may create sufficient pressure to cause thrust loads at the vent. Thrust from the GOX vent could cause the booster to rotate and eventually tumble. For recoverable boosters, this could cause tangling of parachute suspension lines and consequent loss of the booster. If boosters are expendable, this hazard is not applicable, and tumbling may be required to prevent overshoot of the disposal area.

HAZARD CAUSE: Tumbling of the booster caused by thrust of vented oxygen.

HAZARD EFFECT: Loss of booster.

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design the venting system to produce zero thrust in flight.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-K-012 (LRB-P-K-806)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: K - Cryogenic Tanks and Systems

DATE: 4 / 12 / 88

HAZARD TITLE: Cryogenic tanks and systems can cause or be jeopardized by vibration, acoustic loads or shock during propellant loading for test or flight.

HAZARDOUS CONDITION: Failure of level sensors in the LOX tank or malfunction of the loading system (including computer malfunction) could begin fast fill of the LOX tank before chilldown was completed. This could cause buckling and consequent structural failure of the LOX tank.

HAZARD CAUSE: Transition to fast fill before chilldown is complete

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Determine the maximum time required from the beginning of chilldown until the LOX tank has redistributed stresses sufficiently to begin fast fill. Provide for a fail safe timed inhibit for transition to fast fill after chilldown until the maximum time required has elapsed. If possible, eliminate the level sensor as a means of determining the transition to fast fill.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-K-013 (LRB-P-K-847)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: K - Cryogenic Tanks and Systems

DATE: 4 / 12 / 88

HAZARD TITLE: Cryogenic tanks and systems can cause or be jeopardized by leaks during flight readiness firing (FRF) of the STS vehicle.

HAZARDOUS CONDITION: The LOX tank and (the pressurized booster) helium tank are connected to their respective systems by flanged connections which are SFP leak points. Leakage from these points could cause loss of propellant or pressurant, icing, increased oxygen concentration in locations where oxygen may contribute to flammability, or other undesired conditions.

HAZARD CAUSE: SFP leaks at flanges.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Provide redundant seals at all potential SFP leak points.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Proof test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-K-014 (LRB-P-K-854)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: K - Cryogenic Tanks and Systems

DATE: 4 / 13 / 88

HAZARD TITLE: Cryogenic tanks and systems can cause or be jeopardized by leaks during propellant loading for test or flight.

HAZARDOUS CONDITION: Leakage of vacuum jackets on flexible joints of the supercritical helium system (and, to a lesser extent in the LOX system) can allow ice (or liquid and solid air in the case of helium) to form in the annuli between the inner and outer bellows. Ice or liquid can restrict the motion of the bellows and impart excessive stress to the surrounding piping and structure. Warming of the annular contents at the termination of loading or during flight could burst the bellows. If the outer bellows bursts, massive icing could occur, further restricting movement. If the inner bellows bursts, the annular contents could be entrained in the piping and become contamination while the outer bellows would then experience massive icing as a result of direct contact with the media contained.

HAZARD CAUSE: Leakage of vacuum bellows around flexible joints.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Fill the annuli of flexible joints with dry argon at a slightly positive pressure to prevent slow inward leakage of outside air. Install a "pop dome" pressure indicator which is convex when under pressure and concave at zero or negative pressure. Require the ice/frost inspection crew to examine these indicators, or do so by television or other means, prior to launch. Design the outer bellows to fail first in the event that annular pressure becomes excessive.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Operation and maintenance instructions

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-K-015 (LRB-P-K-857)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: K - Cryogenic Tanks and Systems

DATE: 4 / 13 / 88

HAZARD TITLE: Cryogenic tanks and systems can cause or be jeopardized by leaks during nominal flight from liftoff to LRB burnout.

HAZARDOUS CONDITION: Due to valve and/or electrical switch tolerances, a cryogenic vent valve could remain partially open while indicating to the booster electronics that it was actually closed. This condition could cause loss of ullage pressure, loss of propellant, malfunction of ullage pressure controls or hazardous oxygen venting. See also hazard K-545.

HAZARD CAUSE: Partially open vent/relief valve indicated closed.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design the valve to minimize the possibility that the valve could be only partially closed. Design the switch so that the valve must close before the switch contacts close. Monitor vents during liquid loading to verify that gas flows out of the vents when the valve switch indicates that the valve is open, and that gas does not flow out of the valve when the switch indicates that the valve is closed. The HGDS with a purge gas other than oxygen or helium in the vent umbilical can perhaps be used for this purpose. Warming of the effluent may be required with helium due to the possibility of liquefying or solidifying the purge gas otherwise.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-K-016 (LRB-P-K-901)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: K - Cryogenic Tanks and Systems

DATE: 5 / 3 / 88

HAZARD TITLE: Cryogenic tanks and systems can cause or be jeopardized by lightning or electromagnetic discharge during rollout from the VAB and preloading preparation.

HAZARDOUS CONDITION: During rollout, the STS vehicle is not protected by any other system from lightning. The vehicle functions as its own lightning rod. The LRBs are likely to be longer than the SRBs, and therefore will be less protected than the SRBs by the so-called "cone of protection" which extends downward from the ET nose spike. If the helium tank (in pressure fed boosters) is made of a carbon fiber composite, currents through the carbon filaments, induced by a lightning strike, could cause simultaneous heating of the matrix and electromagnetic repulsion of the fibers. This would cause weakening of the structure of the pressure vessel, and could cause failure of the pressure vessel during loading. The hazard of damage to carbon fiber composites occurs during any life cycle phase if lightning strikes the booster, and the consequences of damage will be most severe when the tank is pressurized, filled and flown. This hazard, of course, is not applicable if composite tanks are not used.

HAZARD CAUSE: Delamination of carbon fibers in composite tanks caused by currents induced by lightning strike.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design composite pressure vessels with an insulated thimble or insert around metallic penetrations, and provide an outer conductive sheath around the tank of sufficient thickness to conduct currents which result from voltages between the penetrations induced by lightning strike. It may be possible to shield composite tanks entirely so that a conductive sheath is not necessary.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-K-017 (LRB-P-K-902)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: K - Cryogenic Tanks and Systems

DATE: 4 / 13 / 88

HAZARD TITLE: Cryogenic tanks and systems can cause or be jeopardized by lightning or electromagnetic discharge during propellant loading for test or flight.

HAZARDOUS CONDITION: Due to the low ignition energy of RP-1, it could be ignited by static electricity generated by fluid flow or from other sources. Ignition of a fuel leak or spill could cause a fire which would serve as an ignition source for other flammable materials.

HAZARD CAUSE: Ignition of RP-1 by static electricity.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Insure that the entire fueling system is completely grounded to preclude the buildup of static electricity.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-K-018 (LRB-P-K-943)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: K - Cryogenic Tanks and Systems

DATE: 4 / 13 / 88

HAZARD TITLE: Cryogenic tanks and systems can cause or be jeopardized by chemical activity during flight readiness firing (FRF) of the STS vehicle.

HAZARDOUS CONDITION: Due to the high heat loads during FRF, chemical reactions which would normally be slow enough to be disregarded could take place. If such reactions are potentially damaging, such as corrosion, the safety of the vehicle could be jeopardized.

HAZARD CAUSE: Increase in chemical reaction rate due to high heat loading during FRF.

HAZARD EFFECT: Damage to flight hardware

HAZARD LEVEL: Critical

SAFETY REQUIREMENTS: All materials and coatings must be chosen not only for the flight conditions expected, but also for protection of the STS during FRF. All potential corrosion or other damaging conditions should be examined to insure that they do not pose a hazard during or after FRF.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-M-001 (LRB-P-M-592)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: M - Engines and Controllers

DATE: 4 / 15 / 88

HAZARD TITLE: Engines and/or controllers can cause or be jeopardized by unsafe or unhygienic working conditions during launch abort activities, including mission postponement (scrub).

HAZARDOUS CONDITION: If an abort is caused by a malfunction in the propellant feed system to one or more of the engines, or if one or more of the engines fails to ignite, propellants could be dumped into the LRB flame bucket. Since RP-1 burns in air, this condition could lead to a fire which would imperil the STS vehicle, escaping crew, and launch support personnel.

HAZARD CAUSE: Propellents dumped by the engines into the flame bucket due to a malfunction at engine start.

HAZARD EFFECT: Loss of STS vehicle, crew injury and/or launch crew injury or death.

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Provide fire extinguishment in the flame bucket. (The current water deluge system may not be sufficient since RP-1 floats.) Also, design the engine to minimize the possibility that propellants could escape unburned from the engines.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Provides appropriate safety devices

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-M-002 (LRB-P-M-713)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: M - Engines and Controllers

DATE: 4 / 15 / 88

HAZARD TITLE: Engines and/or controllers can cause or be jeopardized by radiation or sunlight during nominal flight from liftoff to LRB burnout.

HAZARDOUS CONDITION: At this time there is no requirement for the engine controllers to withstand a nuclear event. Controllers are likely to contain solid state components which are sensitive to the electromagnetic pulse or neutron radiation from a nuclear event. If a nuclear event occurred during flight, the controllers could malfunction, causing loss of engine control and anomalous engine operation. Since the STS is used to launch military payloads, it could be considered a military target.

HAZARD CAUSE: Malfunction of engine controllers caused by a nuclear event.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design the engine controllers to withstand any nuclear event capable of being withstood by the vehicle structure.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-M-003 (LRB-P-M-729)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: M - Engines and Controllers

DATE: 4 / 15 / 88

HAZARD TITLE: Engines and/or controllers can cause or be jeopardized by moisture or precipitation during transportation from manufacture to launch site or after recovery.

HAZARDOUS CONDITION: Rainwater draining into enclosed spaces in the engines during transportation could remain in the engines and freeze, causing structural damage or plugging of small orifices. Since the booster will probably be transported in the horizontal position, drains will be at right angles to their normal stacked orientation, therefore there is a possibility that rainwater would not drain out. Even water ingested into the engines by capillary action could freeze in the presence of liquid oxygen, making the engine unready for flight.

HAZARD CAUSE: Moisture in engines.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design the engines to tolerate, as much as possible, the effects of rainwater, frost or dew intrusion. Purge the engines with dry hot gas sufficiently prior to flight that all spaces in which water could cause damage are dry.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-M-004 (LRB-P-M-758)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: M - Engines and Controllers

DATE: 4 / 15 / 88

HAZARD TITLE: Engines and/or controllers can cause or be jeopardized by electrical system malfunction during propellant loading for test or flight.

HAZARDOUS CONDITION: Engines employing cryogenic oxygen will probably require thermal conditioning prior to ignition. Engine temperature and other parameters will be monitored by the engine controllers, which will indicate an "engine ready" condition as a prerequisite to ignition. A malfunctioning controller could produce an "engine ready" signal when the engine was not properly conditioned for flight. This condition could allow an unready engine to be ignited, with consequent damage to the engine, possibly including engine explosion upon ignition.

HAZARD CAUSE: Erroneous "engine ready" signal from malfunctioning engine controller

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Program the engine controllers with algorithms which are self-checking and verify the accuracy of parameters measured by multiple independent means. Provide sufficient redundancy that single failures not only fail operational, but provide an indication of the failed condition before flight. At least three simultaneous failures should be necessary for a hazardous condition to occur.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-M-005 (LRB-P-M-786)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: M - Engines and Controllers

DATE: 4 / 15 / 88

HAZARD TITLE: Engines and/or controllers can cause or be jeopardized by differential pressure during intact abort, including RTLS, TAL, AOA and ATO.

HAZARDOUS CONDITION: The current baseline configurations permit intact abort from liftoff with one engine out. This situation would require the three remaining engines on each booster to go promptly to approximately 133% of the nominal thrust. Due to the finite time for pressurization changes, the increased supply of ullage pressure gas to the LOX tank from each engine will lag the increased propellant consumption per engine. This may cause a momentary decrease in the ullage pressure of the affected propellant tank(s), with a possible violation of engine intake pressure requirements. This condition would be exacerbated by a momentary loss of thrust, which would decrease the head pressure due to the depth of fluid in the tank and the acceleration of the vehicle. Under these conditions, combustion instabilities, turbopump cavitation or other undesirable effects could occur which could lead to shutdown of one or more of the remaining good engines. The result would be inability to achieve an intact abort.

HAZARD CAUSE: Loss of engine inlet pressure caused by pressurization lag.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: The characteristics of the propulsion system must be carefully integrated to insure that the pressure drop from this cause does not jeopardize the engines and that adequate margins of safety are maintained. It may be necessary to provide some sort of reserve pressurization capability which can instantaneously increase the ullage gas flow rate from each engine to match the instantaneous demand increase.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-M-006 (LRB-P-M-914)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: M - Engines and Controllers

DATE: 4 / 18 / 88

HAZARD TITLE: Engines and/or controllers can cause or be jeopardized by faulty documentation during manufacture and fabrication of subsystems and components.

HAZARDOUS CONDITION: Engines and associated subsystems such as TVC actuators are likely to be sufficiently alike that they will have many interchangeable components. However, there may be slight differences between engines and gimballing mechanisms on left and right boosters, or perhaps between engines and associated systems in different positions on the same booster. Under these conditions, there exists the possibility of the wrong component being incorporated into an engine assembly, or of an engine assembly being installed in the wrong location, especially if common manufacturing tooling makes such interchanges possible. Effects range from off nominal performance to loss of the vehicle during test or flight.

HAZARD CAUSE: Incorporation of improper parts or installation of an engine assembly in the wrong location.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Documentation for each engine assembly should be sufficient, and should incorporate enough safeguards, that approval for installation of an engine cannot be given unless there is no doubt whatever that the engine and all of its components and associated systems are intended for the specific location in which it is to be installed. This may require innovative documentation methods. In addition, parts which can be hazardous must be keyed so that it is physically impossible to install the wrong parts on an engine, or to install an engine assembly in the wrong location.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Mandatory inspection points

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-N-001 (LRB-P-N-579)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: N - TVC Actuators and Subsystem

DATE: 4 / 19 / 88

HAZARD TITLE: TVC actuators and subsystem can cause or be jeopardized by unsafe or unhygienic working conditions during inspection and test of the LRB and subsystems.

HAZARDOUS CONDITION: The current baseline configurations do not show all engines gimballing together (in the same direction at the same time). This condition would at least potentially allow the engines to gimbal toward each other during testing. Any gimballing of the engines during test, especially a condition in which the engine bells moved toward one another, could create pinch points which would be hazardous for personnel in the vicinity of the engine bells during testing of the TVC subsystem.

HAZARD CAUSE: Movement of the LRB engines during testing

HAZARD EFFECT: Launch crew injury or death

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Provide personnel access platforms or elevators with a cage which provides sufficient space for workers to avoid being crushed if the engine bells are inadvertently moved toward each other. The cage must be strong enough that full power to the TVC actuators cannot crush it. In addition, a procedure must be adopted to lock the engines to prevent gimballing when workers are near the engine bells. Means such as cable restraints, overtravel limit switches, electric eyes or other suitable methods must be used to keep the access cage from being driven against any part of the engines or LRB piping or structure. Each of these means must include a means of self test before elevating the cage into the vicinity of the engines to prevent damage to the engines if the cage is initially improperly positioned.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: The cage would be an appropriate safety device to protect the workers, while the restraints or limit mechanisms would be safety devices to protect the flight hardware. An appropriate special procedure would be required to lock the TVC mechanism when workers were in a position where they or the engines could otherwise be imperiled.

VERIFICATION METHODS: Operation and maintenance instructions

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-N-002 (LRB-P-N-585)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: N - TVC Actuators and Subsystem

DATE: 4 / 19 / 88

HAZARD TITLE: TVC actuators and subsystem can cause or be jeopardized by unsafe or unhygienic working conditions during transportation from manufacture to launch site or after recovery.

HAZARDOUS CONDITION: Improperly positioned engines could impact facility doorway edges during movement through restricted openings.

HAZARD CAUSE: Engines improperly positioned during transportation

HAZARD EFFECT: Damage to flight hardware

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design all doorways through which the completed booster must pass to clear the engine bells at their extreme limits of travel with sufficient extra clearance on all sides.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test with pathfinder.

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-N-003 (LRB-P-N-774)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: N - TVC Actuators and Subsystem

DATE: 4 / 19 / 88

HAZARD TITLE: TVC actuators and subsystem can cause or be jeopardized by differential pressure during test firing of engines and/or the completed booster.

HAZARDOUS CONDITION: If hydraulic or pneumatic systems are used to control the TVC system during test firing, the length of lines, valve opening or closing times, or other parameters of the testing apparatus may be different than that of the analogous flight subsystems. This condition could cause the reactions to control inputs to lead or lag those which would be encountered in flight. These differences in reaction times could cause either insufficient or excessive pressures to be developed in the respective systems. If excessive pressures occur, flight components such as hoses or piping could be damaged. If these control inputs are produced to prevent or counteract hazardous conditions, insufficient pressure could allow the hazardous conditions to occur. In either case, damage to flight hardware could result.

HAZARD CAUSE: Timing and other parameters of the test apparatus which are different from those of the operational vehicle during flight

HAZARD EFFECT: Damage to flight hardware

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: The testing apparatus must be designed to duplicate as closely as possible the operational parameters of the flight vehicle. Where control inputs prevent or counteract potentially hazardous conditions, The reaction to these inputs must be sufficiently rapid to prevent the hazardous conditions from occurring.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-N-004 (LRB-P-N-843)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: N - TVC Actuators and Subsystem

DATE: 4 / 19 / 88

HAZARD TITLE: TVC actuators and subsystem can cause or be jeopardized by leaks during inspection and test of the LRB and subsystems.

HAZARDOUS CONDITION: If hydraulic systems are used, a leak during testing in this system could produce a high pressure spray of hydraulic fluid which could injure test personnel, contaminate adjacent equipment, or, if the fluid is flammable, present a fire hazard.

HAZARD CAUSE: Leakage of hydraulic fluid during testing.

HAZARD EFFECT: Injury to inspection personnel, contamination of equipment, or fire

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Use fire resistant hydraulic fluid, exclude personnel from the test area during testing, or eliminate the use of hydraulic systems for TVC.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimization by design and institution of special procedures.

VERIFICATION METHODS: Manufacturing process plans

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-N-005 (LRB-P-N-946)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: N - TVC Actuators and Subsystem

DATE: 4 / 19 / 88

HAZARD TITLE: TVC actuators and subsystem can cause or be jeopardized by chemical activity during storage, including storage of major components.

HAZARDOUS CONDITION: The TVC actuators will probably have linear actuators such as hydraulic rams or lead screws which require extremely close tolerances for proper operation, but are exposed due to the requirement for these devices to move in and out of their driving mechanisms. Corrosion on these items could interfere with motion, with a resulting reduction in the rate or range of travel. If this occurs, TVC authority could be jeopardized. Corrosion damage would be a function of time and the severity of the environments to which these components are exposed.

HAZARD CAUSE: Corrosion of TVC driving components

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design sensitive components to be made of corrosion resisting materials and provide protective coatings or lubrication which would not interfere with operation. In the most extreme case, protective coverings for these items may be required, to be removed before flight.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Either eliminate by design or provide protective devices.

VERIFICATION METHODS: Mandatory inspection points

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-N-006 (LRB-P-N-1014)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: N - TVC Actuators and Subsystem

DATE: 4 / 19 / 88

HAZARD TITLE: TVC actuators and subsystem can cause or be jeopardized by wear during test firing of engines and/or the completed booster.

HAZARDOUS CONDITION: Linear actuators used in the TVC system will have surfaces that slide on each other. This will produce a finite amount of wear each time the actuator is operated. For this reason, actuators will probably have a finite life, based on the number of actuation cycles. If this life is exceed, operation of the TVC in flight may be jeopardized.

HAZARD CAUSE: Wear of linear actuators.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Determine by test the amount of actuation cycles for which wear is not excessive, and insure that sufficient life remains prior to flight.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Mandatory inspection points

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-O-001 (LRB-P-O-679)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: O - Orbiter, Subsystems and Payload

DATE: 4 / 20 / 88

HAZARD TITLE: The Orbiter, subsystems and payload can cause or be jeopardized by heat sources during flight readiness firing (FRF) of the STS vehicle.

HAZARDOUS CONDITION: A full FRF will include firing the LRBs as well as the SSMEs. The resulting heat loading is higher than now occurs during FRF. Although the Orbiter is designed to withstand high heat loads, the Orbiter TPS is designed for heat being added to forward or leading surfaces. During FRF, heat would be added primarily from the rear. The Orbiter TPS may not be able to withstand the radiative and convective heat loading at the rear of the spacecraft plus the added load of subsequent flight. If the TPS is damaged during FRF, reentry capability of the Orbiter may be jeopardized.

HAZARD CAUSE: Head loading on the Orbiter TPS during FRF

HAZARD EFFECT: Loss of the Orbiter during reentry

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Determine the maximum heat load which the Orbiter would experience during FRF, the maximum degree of damage which could be sustained by the Orbiter TPS, and the minimum capability of the TPS after FRF. If this minimum falls below that required for reentry, either increase the Orbiter TPS in the areas affected, or provide protection for the Orbiter during FRF. If neither of these options is feasible, conduct FRF by firing the SSMEs with the LRBs inactivated, then fire the LRBs with the SSMEs inactivated, or vice versa.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: 1) If the Orbiter TPS is increased, this hazard is eliminated by design. 2) If protection is provided for the Orbiter, the control is a safety device. 3) If FRF is conducted by firing engines in sequence, rather than simultaneously, this hazard is controlled by providing effective special procedures.

VERIFICATION METHODS: Verification that whatever method is selected is effective will be based on engineering analysis.

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-O-002 (LRB-P-O-775)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: O - Orbiter, Subsystems and Payload

DATE: 4 / 20 / 88

HAZARD TITLE: The Orbiter, subsystems and payload can cause or be jeopardized by differential pressure during flight readiness firing (FRF) of the STS vehicle.

HAZARDOUS CONDITION: The increased dynamic loads caused by turbulance and blast effects from the simultaneous firing of all engines on the STS vehicle may be significantly more severe than those for which the Orbiter is designed. If this is the case, the Orbiter may be damaged by these loads during FRF.

HAZARD CAUSE: Increased dynamic loads caused by firing all STS engines simultaneously.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Determine by analysis if loads from simultaneous firing of all engines can be excessive. If this is the case, fire engines in sequence instead of simultaneously during FRF.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-O-003 (LRB-P-O-854)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: O - Orbiter, Subsystems and Payload

DATE: 4 / 20 / 88

HAZARD TITLE: The Orbiter, subsystems and payload can cause or be jeopardized by leaks during propellant loading for test or flight.

HAZARDOUS CONDITION: Leakage of supercritical helium could cause air liquefaction near the forward end of pressure fed LRBs. Liquid air or leaking liquid oxygen impinging on the Orbiter could cause cracking of the Orbiter TPS tiles.

HAZARD CAUSE: Leakage of supercritical helium or cryogenic oxygen.

HAZARD EFFECT: Damage to flight hardware

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Provide TV camera coverage of the area between the LRBs and Orbiter and of the sides of the Orbiter and underside of the Orbiter wings during loading. If leakage, as indicated by a plume of vapor, is noted, scrub the launch and empty all propellant tanks.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures. The TV would be a warning device, backed up by effective special procedures.

VERIFICATION METHODS: STS Flight rules

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-P-001 (LRB-P-P-750)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: P - Propellants and Propulsion

DATE: 4 / 22 / 88

HAZARD TITLE: Propellants and/or propulsion systems can cause or be jeopardized by electrical system malfunction during test firing of engines and/or the completed booster.

HAZARDOUS CONDITION: If the complete booster is test fired, facilities instrumentation will probably be connected within the feedback loop which includes the ullage pressure and temperature sensors in the propellant tanks, valves and transducers associated with the engine controllers, and possibly other electrical devices such as propellant feed rate sensors, strain gauges, and other such devices. Electrical malfunction in the facilities instrumentation could interfere with proper operation of the propellant feed system, which could cause anomalous engine operation, overpressurization or underpressurization of the propellant tanks, anomalous operation of the helium heaters (in pressure fed boosters) or other anomalies. Ultimate effects range from loss of test data to engine explosion. Loss of test data or anomalous test results could cause the test results not to be truly indicative of the readiness of the booster for flight, or could allow latent defects to go undetected. This could lead to anomalous operation and loss of the vehicle in flight.

HAZARD CAUSE: Electrical malfunction in facilities instrumentation

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: The facilities instrumentation must be designed with sufficient safety and redundancy that the booster cannot be caused to operate in an unsafe manner, and that anomalous operation of the propellant and other systems would be obvious under all credible conditions of facility instrumentation failure.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-P-002 (LRB-P-P-897)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: P - Propellants and Propulsion

DATE: 4 / 22 / 88

HAZARD TITLE: Propellants and/or propulsion systems can cause or be jeopardized by lightning or electromagnetic discharge during transportation from manufacture to launch site or after recovery.

HAZARDOUS CONDITION: During transportation, the booster will not be configured for flight with all inspection and access ports sealed. Open access ports, of those sealed with non-metallic doors, could allow the electromagnetic pulse from a nearby lightning strike to propagate to the interior of the vehicle where conductors not normally expected to carry currents due to lightning (e.g. pressurization lines) would carry heavy induced currents. This could cause fusion of connections or other problems. It is assumed that any problems which would jeopardize flight could be detected during subsequent inspection.

HAZARD CAUSE: Currents induced by lightning interior to the booster vehicle.

HAZARD EFFECT: Damage to flight hardware

HAZARD LEVEL: Critical

SAFETY REQUIREMENTS: Use metallic covers or other means to prevent electromagnetic propagation to the interior of the booster vehicle. If feasible, design interior conductors to handle the effects of lightning.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Appropriate safety devices and elimination by design, respectively.

VERIFICATION METHODS: Mandatory inspection points or engineering analysis, respectively.

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-P-003 (LRB-P-P-907)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: P - Propellants and Propulsion

DATE: 4 / 22 / 88

HAZARD TITLE: Propellants and/or propulsion systems can cause or be jeopardized by lightning or electromagnetic discharge during separation of the LRB from the STS vehicle.

HAZARDOUS CONDITION: Engine valves, closed at LRB shutdown, could be momentarily opened due to the currents induced in controlling electronics by the abrupt collapse of the magnetic field(s) stored in the wiring inductance. This could cause loss of propellants through the engines or vents at separation. Although the precise consequences of this condition cannot now be predicted without further study, it appears likely that leakage of propellant during separation would be hazardous.

HAZARD CAUSE: Momentary opening of valves due to collapse of magnetic fields stored in wiring inductance during separation.

HAZARD EFFECT: Possible damage to or loss of the STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design all valves which must be closed at separation to lock in the closed position. This locking feature might be accomplished electrically by shorting the valve actuation circuits at or near the valves they operate.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-P-004 (LRB-P-P-986)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: P - Propellants and Propulsion

DATE: 4 / 22 / 88

HAZARD TITLE: Propellants and/or propulsion systems can cause or be jeopardized by operator error during manufacture and fabrication of subsystems and components.

HAZARDOUS CONDITION: Due to the large number of flanges, seals, access openings, manholes, feedthrough connectors and other joined components of the propulsion system, there exists the possibility of connecting the wrong components together if this is physically possible. Examples are feedline segments installed in the wrong sequence, wrong seals inserted in flanged connections, and manhole covers installed in the wrong location. Since many of these connections will be required to be almost identical (e.g. the same diameter), it is economically attractive to machine and bore them on the same tool. Use of the same tool would make these connections physically interchangeable.

HAZARD CAUSE: Non-interchangeable components which have connections which can be physically interchanged.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Key all otherwise physically interchangeable but otherwise incompatible connections so that it is impossible to install them in the incorrect order or location. This could be done by use of a tool which bores almost all of the holes in the same location, but for which one or more holes are drilled slightly off axis in such a manner that it is not possible to fit a bolt through an incompatible connection. Insure that subsequent inspection steps for each part inspect for the proper location of the off axis hole.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Mandatory inspection points

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-P-005 (LRB-P-P-987)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: P - Propellants and Propulsion

DATE: 4 / 22 / 88

HAZARD TITLE: Propellants and/or propulsion systems can cause or be jeopardized by operator error during inspection and test of the LRB and subsystems.

HAZARDOUS CONDITION: Due to the thickness of the LRB propellant tanks, welding will require multiple passes. It will be necessary on each pass to x-ray the weld for defects, which increases the number of x-ray film strips which must be inspected. Since a critical defect in one pass would be covered by a subsequent pass, most of these defects will not be capable of being discovered by surface inspection (e.g. dye penetrant) after completion of the weld. Since critical defects will in most cases be smaller than the thickness of the weld, lack of leakage at a defect is not an indicator of a good weld. The mode of failure of most of the welds will be in burst, which would result in a missed flaw causing a catastrophic failure during proof test or, for any weld not fully loaded in proof, in flight.

HAZARD CAUSE: Undetected critical flaw in a tank weld.

HAZARD EFFECT: Loss of booster during proof test or loss of STS vehicle in flight.

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Increase the number of independent inspections of each weld pass, and dye penetrant inspect each weld pass before the next pass is begun. Use of innovative techniques, such as ultrasound or electromagnetic inspection should be developed.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Mandatory inspection points

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-P-006 (LRB-P-P-1041)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: P - Propellants and Propulsion

DATE: 5 / 9 / 88

HAZARD TITLE: Propellants and/or propulsion systems can cause or be jeopardized by emergencies during transportation from manufacture to launch site or after recovery.

HAZARDOUS CONDITION: Although LOX is currently transported by barge, RP-1 will likely be transported by rail. The large quantity used for each launch may require a long succession of tank cars, which could cause an emergency if the train were to be derailed or involved in any other accident resulting in a massive fuel spill.

HAZARD CAUSE: Enroute derailment of RP-1 train.

HAZARD EFFECT: Public emergency

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Due to the political sensitivity of this issue, it may be wise to use special trains for this purpose, and to escort them by guard engines a short distance in front of the train, and perhaps with escort guards. In any case, detailed emergency plans must be coordinated between NASA and local authorities and the management of the railroad(s) involved.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Emergency plans and rehearsals

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-Q-001 (LRB-P-Q-537)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: Q - Crew Access Provisions

DATE: 4 / 24 / 88

HAZARD TITLE: Crew access provisions can cause or be jeopardized by hazardous environments during transportation from manufacture to launch site or after recovery.

HAZARDOUS CONDITION: If the LRB is pressurized with nitrogen or helium, leaks during transportation or storage may create atmospheres which do not support respiration.

HAZARD CAUSE: Leakage of pressurants which do not support respiration.

HAZARD EFFECT: Launch crew injury or death

HAZARD LEVEL: Controlled

SAFETY REQUIREMENTS: This hazard may be adequately controlled by monitoring atmospheres in access ways, perhaps by a transporter connection to the HGDS manifolds. Where the potential for worker asphyxiation exists, use of the "buddy system" and self contained breathing apparatus or air line supplied respirators are mandatory. Where helium is the pressurant, persons working in or near the LRB should be in constant audio communication over a two-way radio or telephone line, and should speak often enough that the characteristic "Donald Duck" voice which results from speaking with helium in the lungs can be heard in sufficient time for the affected individual to escape or be rescued. Procedures should be written to implement these and other safety measures found appropriate.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures and provides appropriate personal protective equipment

VERIFICATION METHODS: Operation and maintenance instructions and certificates of training.

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-Q-002 (LRB-P-Q-747)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: Q - Crew Access Provisions

DATE: 4 / 24 / 88

HAZARD TITLE: Crew access provisions can cause or be jeopardized by electrical system malfunction during inspection and test of the LRB and subsystems.

HAZARDOUS CONDITION: Workers in confined spaces could be jeopardized by power failure of the lighting system or a short circuit in electrical cables within the enclosure.

HAZARD CAUSE: Power failure or electrical short circuit.

HAZARD EFFECT: Launch crew injury or death

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Power sources to lighting of enclosed spaces where workers may have to enter should be connected to at least two separate mains to avoid total failure if one of the mains is interrupted. Lights should be enclosed in polycarbonate to reduce the possibility of breakage and the hazards associated with broken glass. Electrical power sources within the enclosure should be protected by intrinsically safe isolation transformers having circuit breakers in both leads and having both the source and return isolated from ground. Electrical power should be of safe voltage and all cables passing through access openings should be armored.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-Q-003 (LRB-P-Q-1046)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: Q - Crew Access Provisions

DATE: 4 / 24 / 88

HAZARD TITLE: Crew access provisions can cause or be jeopardized by emergencies during propellant loading for test or flight.

HAZARDOUS CONDITION: It is expected that some inspection and test activity will be required in and around the LRB during propellant loading or countdown, or possibly after a launch abort. At present, there is no ready means of prompt escape from the SRB, since very little checkout activity is currently required for the SRB. There exists the possibility that an emergency might jeopardize the final checkout crew on the LRB for which prompt escape would be required. Without some new means of escape, prompt retirement from the LRB, especially from upper levels, is not possible.

HAZARD CAUSE: Lack of a prompt means of escape for the LRB checkout crew.

HAZARD EFFECT: Launch crew injury or death

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Provide a safe, easily accessible means of prompt escape from any location on or in the LRB where prelaunch checkout crew members may have to work.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Emergency plans and rehearsals

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-R-001 (LRB-P-R-531)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: R - Range Safety System

DATE: 4 / 25 / 88

HAZARD TITLE: The range safety system can cause or be jeopardized by hazardous environments during inspection and test of the LRB and subsystems.

HAZARDOUS CONDITION: Although it can be assumed that the RSS will have a standard safe and arm (S&A) device which will interrupt the explosive train in the safe position, inadvertent ignition of the NASA standard initiators (NSIs) will still create an explosive shock at the location of the S&A device. The blast effects from inadvertent ignition of the NSIs could pose a hazard to personnel and possibly to adjacent equipment.

HAZARD CAUSE: Inadvertent ignition of the NSIs

HAZARD EFFECT: Damage to flight hardware and/or launch crew injury or death

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Do not install the initiators until the latest possible time before launch. Install the initiators with a short in the firing circuit as close as possible to the initiators and remove the short at the latest possible time before launch. Avoid, to the extent possible, running a current through installed initiators. Locate the safe and arm device where detonation of the NSIs will not jeopardize surrounding equipment. To the extent possible, do not allow workers around installed initiators.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Operation and maintenance instructions

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-R-002 (LRB-P-R-534)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: R - Range Safety System

DATE: 4 / 25 / 88

HAZARD TITLE: The range safety system can cause or be jeopardized by hazardous environments during test firing of engines and/or the completed booster.

HAZARDOUS CONDITION: Heat and dynamic loads during test firing, including FRF, may produce excessive heating of or vibration in the RSS enclosure. This environment may cause a physical or chemical change in one or more of the explosive components which would render them susceptible to detonation by the subsequent shock or vibration of flight.

HAZARD CAUSE: Excessive heating or dynamic loading of one or more RSS components

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Do not install RSS explosive components until all static firing tests have been completed.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Operation and maintenance instructions

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-R-003 (LRB-P-R-542)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: R - Range Safety System

DATE: 4 / 25 / 88

HAZARD TITLE: The range safety system can cause or be jeopardized by hazardous environments during propellant loading for test or flight.

HAZARDOUS CONDITION: Excessive cooling of explosive components of the RSS may crystallize the explosive or cause other physical or chemical changes which could sensitize the explosive, causing it to detonate due to heating, vibration or shock during testing or flight.

HAZARD CAUSE: Excessive cooling of explosive components.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Determine by test the lowest temperature which may be safely tolerated by each explosive component, and insure that these components are insulated sufficiently from cryogenically cooled surfaces so that heat soak from the surrounding environment, at the lowest credible ambient temperature, is sufficient to maintain each explosive well above this temperature. Verify the lowest temperature attainable by test, imposing test conditions which simulate the maximum number of credible failures of the insulating method used.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-R-004 (LRB-P-R-543)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: R - Range Safety System

DATE: 4 / 25 / 88

HAZARD TITLE: The range safety system can cause or be jeopardized by hazardous environments during countdown to liftoff or abort.

HAZARDOUS CONDITION: Currently, the RSS safe and arm device is armed prior to launch while the vehicle is still on the pad and there is no danger whatever to the public. This procedure would allow (admittedly unlikely) inadvertent detonation of the NSIs to destroy the STS vehicle when there is no requirement to do so. Since the ignition and throttle up of the SSMEs and LRBs subjects the STS vehicle to transient heat and shock loads which are somewhat different than those encountered in flight, there exists the possibility that an inadvertent detonation could occur only during the engine startup period to shortly after launch, when the STS vehicle is still not a hazard to the public. Inadvertent detonation of the RSS during this time would destroy the vehicle even though the RSS does not have to be functional (armed) until it could constitute a public danger. The procedure of arming the RSS before liftoff therefore adds an element of risk without overriding benefit.

HAZARD CAUSE: Arming of the RSS prior to liftoff.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design the RSS to be armed at liftoff, possibly by a lanyard which rotates the S&A device to the armed position mechanically with the rise of the vehicle.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-R-005 (LRB-P-R-545)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: R - Range Safety System

DATE: 4 / 25 / 88

HAZARD TITLE: The range safety system can cause or be jeopardized by hazardous environments during nominal flight from liftoff to LRB burnout.

HAZARDOUS CONDITION: Ram air in the cable tray in which the RSS is located could cause sufficient aerodynamic heating that the RSS detonators would fire or the explosive could be ignited and burn. Either case would destroy the STS vehicle.

HAZARD CAUSE: Aerodynamic heating of the RSS explosive.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Pack the cable tray with foam or other material to eliminate aerodynamic heating due to ram air. Insulate RSS components sufficiently from vehicle structure subject to aerodynamic heating so that excessive heat is not conducted to these components from the surrounding structure.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-R-006 (LRB-P-R-598)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: R - Range Safety System

DATE: 4 / 25 / 88

HAZARD TITLE: The range safety system can cause or be jeopardized by unsafe or unhygienic working conditions during floatation (of recoverable boosters) until recovery.

HAZARDOUS CONDITION: If the RSS is armed at splashdown, there is a danger that seawater intrusion could short out RSS electronics and fire the RSS, possibly during recovery operations. This situation could jeopardize recovery personnel and equipment as well as the booster. This hazard is not applicable to expendable boosters.

HAZARD CAUSE: RSS S&A device in the armed position at splashdown.

HAZARD EFFECT: Loss of the booster and death or injury to recovery personnel.

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design the S&A device to rotate to the safe position after a period of time corresponding to complete expenditure of propellant and deployment of parachutes so that it is in the safe position at splashdown. This might be accomplished with a mechanical clockwork mechanism.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-R-007 (LRB-P-R-713)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: R - Range Safety System

DATE: 4 / 27 / 88

HAZARD TITLE: The range safety system can cause or be jeopardized by radiation or sunlight during nominal flight from liftoff to LRB burnout.

HAZARDOUS CONDITION: At present, there is no requirement for the RSS electronics to withstand a nuclear event. Since the STS is used to launch military payloads, it may be considered a military target. A nuclear event could disable the STS during flight and cause it to deviate from a safe flight path. If the RSS were disabled also, it might not be possible to destroy the vehicle by ground command.

HAZARD CAUSE: Lack of protection of the RSS electronics against a nuclear event.

HAZARD EFFECT: Public emergency

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design the RSS electronics to withstand the electromagnetic pulse from any nuclear event which could be survived by the vehicle.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-R-008 (LRB-P-R-751)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: R - Range Safety System

DATE: 4 / 27 / 88

HAZARD TITLE: The range safety system can cause or be jeopardized by electrical system malfunction during flight readiness firing (FRF) of the STS vehicle.

HAZARDOUS CONDITION: The heating and acoustic environment of FRF is likely to be greater than at any other time. Any electrical failure, such as loose or improperly crimped connections, improperly secured components, or other failures which might occur due to heat or vibration would likely take place at this time. Lack of complete testing of the RSS electronics after FRF could allow a vehicle with a non-functional RSS system to be launched.

HAZARD CAUSE: Damage to RSS during FRF.

HAZARD EFFECT: Public emergency

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Conduct a complete test of the RSS after FRF.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Operation and maintenance instructions

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-R-009 (LRB-P-R-809)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: R - Range Safety System

DATE: 4 / 28 / 88

HAZARD TITLE: The range safety system can cause or be jeopardized by vibration, acoustic loads or shock during nominal flight from liftoff to LRB burnout.

HAZARDOUS CONDITION: The RSS is an explosive device which will destroy the STS vehicle if detonated. Detonation can occur as the result of a sequence of several extremely unlikely failures, or by deliberate command from the ground. The destruct command can be transmitted by anyone having a transmitter of suitable frequency, power and modulation capability if the operational codes for arming and firing of the RSS are known. Although explosive devices are among the most reliable of aerospace hardware items, the possibility of inadvertent detonation still exists. Similarly, although the operational codes are a closely guarded secret, compromise of this secret could allow the vehicle to be destroyed as a hostile act. In addition, it is possible to destroy the vehicle by ground command by transmitting a sequence of codes, in effect trying codes until the right one is found. Current specifications require that the code be sufficiently complex that the probability of generating the correct code by trying a random sequence of codes for a half hour be less than "one in a million." In summary, while the RSS can be considered a safe and reliable system, it is still one which is designed to destroy the vehicle, and is less safe than if it were not installed at all.

HAZARD CAUSE: Use of an explosive device on the vehicle activated by ground command

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Consideration should be given to other methods by which the public could be protected from any danger for which the RSS is now the only protection. Since the vehicle or any of its components are hazardous only at low altitudes or upon impact with the ground, it might be possible for a component to be destroyed by a missile fired from an aircraft or from the ground. In any case, a reevaluation of the political and technical considerations on which the requirements for an RSS are currently based appears to be warranted. This should be accomplished with the ultimate purpose of removing the RSS from the vehicle and using other methods to protect the public.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Manufacturing process plans

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-R-010 (LRB-P-R-975)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: R - Range Safety System

DATE: 4 / 28 / 88

HAZARD TITLE: The range safety system can cause or be jeopardized by computer system malfunction during countdown to liftoff or abort.

HAZARDOUS CONDITION: Currently a large number of tests of the RSS are required prior to launch. Some of these are computerized diagnostics. If there is a computer malfunction during the time that these tests are being conducted, it is possible that a malfunction of the RSS would go undetected. This could cause the loss of the only vehicle destruct capability currently provided.

HAZARD CAUSE: Computer malfunction during test of the RSS.

HAZARD EFFECT: Public emergency

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: This hazard could be eliminated by providing a means of destruction of the vehicle other than an on-board electrically initiated ordnance system.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Manufacturing process plans

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-R-011 (LRB-P-R-1002)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: R - Range Safety System

DATE: 4 / 28 / 88

HAZARD TITLE: The range safety system can cause or be jeopardized by operator error during intact abort, including RTLS, TAL, AOA and ATO.

HAZARDOUS CONDITION: The throttle capability of the LRB will make possible recovery from flight anomalies which are now hazardous to the public. Therefore, the possibility exists that the Range Safety Officer (RSO) might destroy the vehicle, based on trajectory analysis, when the flight anomaly could otherwise have been corrected.

HAZARD CAUSE: Destruction of the STS vehicle by the RSO.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Revise current destruction criteria to permit the RSO to destroy the vehicle only when it constitutes a clear and present danger to public safety, regardless of any deviation from nominal trajectory.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: STS Flight rules

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-S-001 (LRB-P-S-578)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: S - Vehicle Structure and Material

DATE: 5 / 10 / 88

HAZARD TITLE: Vehicle structure and material can cause or be jeopardized by unsafe or unhygienic working conditions during manufacture and fabrication of subsystems and components.

HAZARDOUS CONDITION: The current baseline vehicles are constructed of aluminum alloy containing 1.5% to 3.5% lithium. The addition of lithium to the basic aluminum alloy makes the moten metal potentially explosive in the presence of moisture. In addition, the primary health hazard when handling this material is exposure to lithium oxide when oxidation takes place. Overexposure to lithium oxide can result in irritation of the upper respiratory tract, skin and eyes. The potential for public hazard exists if aluminum-lithium scrap is mixed with other aluminum scrap, since the lithium could then be recycled in soft drink containers and other aluminum products which come into contact with foodstuffs and beverages. Remelting of aluminum-lithium scrap requires special precautions which are different from remelting of aluminum.

HAZARD CAUSE: Lithium content of the aluminum alloy.

HAZARD EFFECT: Environmental pollution

HAZARD LEVEL: Critical

SAFETY REQUIREMENTS: Scrap material should be collected for recycle or reuse. If recycled, scrap must be segregated to avoid contamination of other aluminum alloys. If disposed of, these alloys should be buried in a sanitary landfill that offers security against metal scavenging since remelting requires special precautions. NIOSH approved respirators must be used where airborne respirable dusts are a problem. If the material is handled in molten form, special protective equipment, including safety glasses, faceshields, spats, and appropriate flame retardant clothing should be used. (Note - These requirements were taken from material safety data sheets supplied by Alcoa. The current opinion of the MMMSS LRB Engineering representative is that no special precautions not taken with aluminum need be taken for alloys containing lithium. This opinion is expressed in Martin Marietta Interoffice Memo MMMSS-3018/LRB-88-070. The Safety Department position is that the precautions noted above are appropriate due to the lack of an extensive body of industrial hygiene experience with alloys containing lithium.)

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Provides appropriate safety devices and institutes appropriate special procedures.

VERIFICATION METHODS: Manufacturing process plans

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-S-002 (LRB-P-S-775)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: S - Vehicle Structure and Material

DATE: 4 / 28 / 88

HAZARD TITLE: Vehicle structure and material can cause or be jeopardized by differential pressure during flight readiness firing (FRF) of the STS vehicle.

HAZARDOUS CONDITION: The current baseline vehicles show the pressurization line to each tank terminating in a diffuser inside each tank. The diffuser is attached to the tank by a single connection which penetrates the tank. This appears to be a single failure point. If this attachment were to fail, the diffuser would be lost, causing the pressurization gas to enter the tank(s) at supersonic velocity. Work done by the pressurization gas would therefore appear as sloshing of the tank contents, resulting in heating of the propellant instead of an increase in pressure. Heating of the propellant and/or loss of ullage pressure could cause combustion instabilities, pump cavitation, or other undesirable anomalies, ultimately resulting in loss of the vehicle during FRF or during flight.

HAZARD CAUSE: SFP connection of the diffusers

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Attach the diffuser to the tank in such a way that it can survive the structural failure of one component safely.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-S-003 (LRB-P-S-799)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: S - Vehicle Structure and Material

DATE: 4 / 28 / 88

HAZARD TITLE: Vehicle structure and material can cause or be jeopardized by vibration, acoustic loads or shock during flight readiness firing (FRF) of the STS vehicle.

HAZARDOUS CONDITION: The current baseline configurations do not show a screen or filter in the propellant sumps or feedlines. Manufacturing debris or broken fasteners in the tank(s) which are not removed by the cleaning operation could be shaken loose and be ingested the the propellant feed system, ultimately destroying the engines either during the test firing or during flight.

HAZARD CAUSE: Lack of a screen in the tank feeline system.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Incorporate a screen at each tank outlet downstream of all fasteners and places where manufacturing debris could be trapped.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Provides appropriate safety devices

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-S-004 (LRB-P-S-833)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: S - Vehicle Structure and Material

DATE: 4 / 28 / 88

HAZARD TITLE: Vehicle structure and material can cause or be jeopardized by structural loads during nominal flight from liftoff to LRB burnout.

HAZARDOUS CONDITION: There are several locations on the tank where it would be logical to connect component parts with bolts and nuts, blind threaded fasteners, or other fasteners. Failure of a single fastener may overload the others, causing structural failure and ultimate vehicle loss in flight.

HAZARD CAUSE: SFP fasteners

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: There should be no components on the tank which are fastened in such a way that the complete loss of any two fasteners in any position or in any sequence would jeopardize the structural integrity of the vehicle.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Engineering analysis followed by proof test of each fastened interface with representative fasteners removed

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-S-005 (LRB-P-S-901)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: S - Vehicle Structure and Material

DATE: 5 / 10 / 88

HAZARD TITLE: Vehicle structure and material can cause or be jeopardized by lightning or electromagnetic discharge during rollout from the VAB and preloading preparation.

HAZARDOUS CONDITION: During rollout, the STS vehicle is not protected by any other system from lightning. The vehicle functions as its own lightning rod. The LRBs are likely to be longer than the SRBs, and therefore will be less protected than the SRBs by the so-called "cone of protection" which extends downward from the ET nose spike. If lightning strikes the vehicle, it may melt or vaporize some of the structural material at the attach point. Since lightning strike is likely to occur during thunderstorms and rain, this situation will result in a patch of molten aluminum-lithium alloy in the presence of moisture. Explosions of the molten alloy have been known to occur in the presence of moisture. The possibility therefore exists that lightning strike on an alloy containing lithium could cause an explosion. This hazard is enhanced if propellants are aboard, and is particularly severe during countdown and flight.

HAZARD CAUSE: Lightning strike on aluminum-lithium alloy in the presence of moisture.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Conduct a testing program to determine the actual hazard associated with lightning strike on an aluminum-lithium structure to determine what safety precuations might be appropriate. Otherwise, athough there is a small weight penalty, it may be appropriate to construct the forward portion of the LRB, as well as corners, protrusions, and other areas which may be preferentially struck by lightning, of alloys not containing lithium. Alternately, it may be possible to obtain plate stock in which the lithium is concentrated on one side, presenting an outer surface suitable for lightning protection. Protective metallic blankets or "hats" might be considered for protection before flight. In any case, this hazard appears to be a residual risk due to the unpredictable nature of lightning. (Note - These requirements are based on the fact that there is no large body of experience with aluminum-lithium alloys on which to base a decision that no hazard exists. The current opinion of the MMMSS LRB Engineering representative is that no special precautions not taken with aluminum need be taken for alloys containing lithium. This opinion is expressed

in Martin Marietta Interoffice Memo MMMSS-3018/LRB-88-070. The Safety Department position is that the precautions noted above are appropriate due to the lack of an extensive body of experience with lightning strike on aerospace structures constructed of alloys containing lithium.)

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-S-006 (LRB-P-S-1046)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: S - Vehicle Structure and Material

DATE: 4 / 28 / 88

HAZARD TITLE: Vehicle structure and material can cause or be jeopardized by emergencies during propellant loading for test or flight.

HAZARDOUS CONDITION: A fire on the launch pad is likely to be more severe if a component containing lithium is involved, since hot or moten lithium can explode in the presence of water, which would be expected to be used as an extinguishing agent.

HAZARD CAUSE: A fire involving a component containing lithium.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Consideration should be given to the installation of a separate fire suppression system using Lith-X™ to protect the LRBs.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Provides appropriate safety devices

VERIFICATION METHODS: Emergency plans and rehearsals

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-T-001 (LRB-P-T-846)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: T - Thermal Protection Subsystems

DATE: 5 / 2 / 88

HAZARD TITLE: Thermal protection subsystems can cause or be jeopardized by leaks during test firing of engines and/or the completed booster.

HAZARDOUS CONDITION: Due to the thickness of the tank walls, critical defects are likely to be smaller than the wall thickness, which will result in a condition in which leaks are highly unlikely. Analysis of hazard # G-532 indicates that the most likely failure mode of the tanks is burst, not leakage. Therefore, leak testing is likely not to be helpful in detecting flaws which could jeopardize the tank, and any flaws which survive proof test are not likely to leak. If there is a leak under TPS, such as under flanges or seals, a localized debond of the TPS could take place which would form a pocket in which cryopumping could take place. This might produce a divot during propellant loading which could cause localized failure or spalling of the TPS during test or flight. TPS debris could damage the Orbiter.

HAZARD CAUSE: Localized debonding of TPS caused by leaks.

HAZARD EFFECT: Damage to flight hardware

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Tanks should be leak checked during proof test and inspected for evidence of TPS debond during propellant loading.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Operation and maintenance instructions

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-T-002 (LRB-P-T-870)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: T - Thermal Protection Subsystems

DATE: 5 / 2 / 88

HAZARD TITLE: Thermal protection subsystems can cause or be jeopardized by propellant characteristics and products during test firing of engines and/or the completed booster.

HAZARDOUS CONDITION: The current baseline configurations show areas of the booster around the LOX tank covered with SOFI for cryogenic insulation. SOFI is known to be flammable in 25% oxygen. If oxygen venting takes place, the localized heating could cause the TPS to ignite and burn. This could take place during test firing, FRF, launch abort after engine ignition, or from aerodynamic thermal loading during flight.

HAZARD CAUSE: Venting of oxygen in the presence of TPS.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Provide GOX vents during test firing which conduct oxygen far enough away from the booster vehicles that localized concentrations of oxygen cannot occur. Design the GOX venting and propulsion systems not to vent during normal flight. Where GOX venting could be a problem, protect the TPS by using non-flammable TPS where localized oxygen concentrations could occur.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-T-003 (LRB-P-T-901)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: T - Thermal Protection Subsystems

DATE: 5 / 2 / 88

HAZARD TITLE: Thermal protection subsystems can cause or be jeopardized by lightning or electromagnetic discharge during rollout from the VAB and preloading preparation.

HAZARDOUS CONDITION: If lightning punctures the TPS, the combination of chemical breakdown of the TPS at the puncture site combined with localized heating of the substrate could produce localized debonding and/or damage to the TPS. Damaged TPS could cause ice to form, which might then become a debris source, or the TPS itself could fail, producing TPS debris or allowing unacceptable heat loads on the substrate.

HAZARD CAUSE: Puncture of the TPS due to lightning.

HAZARD EFFECT: Damage to flight hardware

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Inspect the LRB TPS after a lightning strike, and replace any damaged TPS.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Operation and maintenance instructions

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-U-001 (LRB-P-U-530)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: U - The Environment or The Public

DATE: 5 / 4 / 88

HAZARD TITLE: The environment or the public can cause or be jeopardized by hazardous environments during manufacture and fabrication of subsystems and components.

HAZARDOUS CONDITION: Chlorofluorocarbons (CFCs) are used in a number of manufacturing operations as cleaning agents. CFCs are believed to deplete the layer of atmospheric ozone which protects the earth's surface from excessive ultraviolet radiation. Continued use of CFCs could be hazardous to the environment.

HAZARD CAUSE: Use of CFCs in manufacturing operations.

HAZARD EFFECT: Environmental pollution

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Either use a non-polluting substitute for CFCs or else use and store them in a facility equipped with a means of safely combining them to form innocuous substances. (The latter is probably not practical since CFCs are not readily reactive chemically.)

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Manufacturing process plans

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-U-002 (LRB-P-U-534)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: U - The Environment or The Public

DATE: 5 / 4 / 88

HAZARD TITLE: The environment or the public can cause or be jeopardized by hazardous environments during test firing of engines and/or the completed booster.

HAZARDOUS CONDITION: The heat of combustion of the engines may be high enough that the exhaust will interact with atmospheric nitrogen to form large amounts of nitrogen oxides. These combine with atmospheric moisture to cause acid rain. Acid rain is an environmental pollutant.

HAZARD CAUSE: Interaction of hot rocket exhaust with atmospheric nitrogen.

HAZARD EFFECT: Environmental pollution

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: An engineering analysis should be conducted to determine the potential for harm posed by this hazard as part of the environmental impact statement. If it appears that this could be a matter of concern, it would be helpful to locate the testing facility where prevailing winds would blow acidic pollutants out to sea.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-V-001 (LRB-P-V-746)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: V - Computer Systems and Software

DATE: 5 / 9 / 88

HAZARD TITLE: Computer systems or software can cause or be jeopardized by electrical system malfunction during manufacture and fabrication of subsystems and components.

HAZARDOUS CONDITION: Computerized systems are finding increased application in manufacturing. Damage to these systems, due to electrical power fluctuations or other causes, can cause anomalies which vary in severity as the degree of autonomy of the systems. For example, a malfunctioning computerized system caused a major explosion which destroyed a facility in which SRB fuel was being mixed. All computerized design and manufacturing tools are subject to this hazard in varying degrees.

HAZARD CAUSE: Failure of a computerized system to fail safe.

HAZARD EFFECT: Damage to flight hardware

HAZARD LEVEL: Critical

SAFETY REQUIREMENTS: The technology of computer safety and software safety must be expanded to meet the needs of the LRB program. At present, there are no sure cures. Each case must be handled individually. Additional research is required in this area, and measures must be taken in the design of each computerized tool (including engineering programs) to insure that the programs fail safe. Because of the lack of maturity of computer safety, this hazard is probably a candidate residual risk.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-W-001 (LRB-P-W-747)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: W - Pressurization Subsystem

DATE: 6 / 22 / 88

HAZARD TITLE: The pressurization subsystem can cause or be jeopardized by electrical system malfunction during inspection and test of the LRB and subsystems.

HAZARDOUS CONDITION: The pressure fed system contains two valves in parallel for the fuel and oxidizer for each of the three gas generators. An electrical malfunction which would open any one of these valves inadvertently would allow fuel or oxidizer to flow to a gas generator, with possible leakage overboard if propellant is loaded. Inadvertent opening of one of the four flow control valves from the pressurization tank would allow on-board pressurant to flow into the piping between the flow control valves and the gas generator supply valves.

HAZARD CAUSE: Inadvertent opening of electrically operated valves

HAZARD EFFECT: launch crew injury or damage to flight hardware

HAZARD LEVEL: Critical

SAFETY REQUIREMENTS: Tests with propellants or pressurants loaded should be carried out as close to launch as practical and persons should stand clear of areas below the gas generator exhaust ports. Tests of individual valves should be made without pressurant or propellants on board. A means should be provided to lock valves closed if danger from inadvertent opening persists.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Provides appropriate safety devices and special procedures

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-W-002 (LRB-P-W-752)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: W - Pressurization Subsystem

DATE: 6 / 22 / 88

HAZARD TITLE: The pressurization subsystem can cause or be jeopardized by electrical system malfunction during preparation for shipment of the booster and ship loose hardware.

HAZARDOUS CONDITION: Tanks will probably be pressurized with dry gas for transportation and storage. If electrical interfaces are checked with the tanks pressurized, any electrical malfunction which could open a valve from the tanks to the gas generators could cause loss of pressurization and potential contamination of the tank(s). Such loss of pressurant could also be caused by a valve leak.

HAZARD CAUSE: Inadvertent opening of valves

HAZARD EFFECT: Contamination of flight hardware

HAZARD LEVEL: Critical

SAFETY REQUIREMENTS: Exhaust ports should be sealed or otherwise protected during transportation and storage. Shorting plugs should be used to short electrical inputs fo the pressurization valves.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Provides appropriate safety devices

VERIFICATION METHODS: Mandatory inspection points

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-W-003 (LRB-P-W-760)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: W - Pressurization Subsystem

DATE: 6 / 22 / 88

HAZARD TITLE: The pressurization subsystem can cause or be jeopardized by electrical system malfunction during launch abort activities, including mission postponement (scrub).

HAZARDOUS CONDITION: If launch is aborted after the pressurization cycle starts on pressure fed LRBs, a subsequent electrical malfunction could open valves which would allow propellant into the gas generators, with possible overboard venting, or which would allow pressurant into the vehicle tanks. At present, there is no relief shown except possibly backwards through the helium fill or prepressurization lines. This condition could store propellant or pressurant in the integral piping. If LOX is allowed into the piping, it would burst the lines unless some means of venting is provided. Pressurant in the lines would present a hazard from released pressurant, forced ejection of the umbilicals upon disconnect, or a fire hazard from fuel.

HAZARD CAUSE: Lack of venting of pressurization lines and tanks

HAZARD EFFECT: Fire, personal injury, damage to flight hardware, or inadvertent ejection of the umbilical disconnect

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Provide vents to safely vent all lines in the event of a launch termination after one or more pressurization systems valves are opened. This requirement has been recognized by the design group; current plans are to incorporate relief capability where needed.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-W-004 (LRB-P-W-763)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: W - Pressurization Subsystem

DATE: 6 / 22 / 88

HAZARD TITLE: The pressurization subsystem can cause or be jeopardized by electrical system malfunction during separation of the LRB from the STS vehicle.

HAZARDOUS CONDITION: Improper sequencing of valve closure in the pressure fed LRB can trap LOX in lines leading to the gas generators. Subsequent warming of the LOX could cause explosion of the propulsion system. This could scatter debris outside the disposal footprint or perhaps endanger the Orbiter or ET.

HAZARD CAUSE: Trapped LOX in gas generator feedlines

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Provide overpressure valves in the lines in which LOX could become entrapped so that it vents harmlessly overboard after SRB separation regardless of valve closure sequence. For expendable boosters, the minimum time interval for pressurization to become hazardous should be calculated; this hazard would be eliminated if this minimum time interval is longer than the maximum interval between LRB separation and achievement of a safe distance from the Orbiter.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-W-005 (LRB-P-W-798)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: W - Pressurization Subsystem

DATE: 6 / 23 / 88

HAZARD TITLE: The pressurization subsystem can cause or be jeopardized by vibration, acoustic loads or shock during test firing of engines and/or the completed booster.

HAZARDOUS CONDITION: Abrupt opening or closing of valves in the pressure fed booster could cause shock waves which could impose excessive strains on piping and other components.

HAZARD CAUSE: Shock waves caused by abrupt opening or closing of valves

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Design the pressurization system to control the generation of shock waves in fluids in the system. It should be noted that transient analysis is included in the pressurization analysis.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-W-006 (LRB-P-W-844)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: W - Pressurization Subsystem

DATE: 6 / 23 / 88

HAZARD TITLE: The pressurization subsystem can cause or be jeopardized by leaks during proof test of pressure vessels and structure.

HAZARDOUS CONDITION: The high working pressure of the pressure fed LRB pressurization system will make leaks at flange seals and other tank penetration points extremely hazardous during proof testing. Such leaks could cut electrical cables or adjacent low pressure plumbing, or could quickly erode gasket material, enlarging the leak.

HAZARD CAUSE: Leakage of high pressure fluid during proof test

HAZARD EFFECT: Damage to facilities

HAZARD LEVEL: Critical

SAFETY REQUIREMENTS: Special attention must be given to the design of temporary seals for high pressure proof testing. Leak checking at flange seals may be necessary during the test to warn of potentially dangerous leaks.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-W-007 (LRB-P-W-854)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: W - Pressurization Subsystem

DATE: 6 / 23 / 88

HAZARD TITLE: The pressurization subsystem can cause or be jeopardized by leaks during propellant loading for test or flight.

HAZARDOUS CONDITION: Leakage of RP-1 represents a fire hazard. Due to the low ignition energy of RP-1, ignition is likely. RP-1 will not dissipate in air, but will form a progressively larger fuel source for a fire with time.

HAZARD CAUSE: Leakage of RP-1

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Areas in which RP-1 could accumulate on the launch pad should be drained or purged either to prevent accumulation of a fuel source or a source of oxidizer, respectively. The HGDS can be used to monitor for RP-1 fumes from enclosed spaces.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Engineering analysis

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-W-008 (LRB-P-W-846)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: W - Pressurization Subsystem

DATE: 6 / 23 / 88

HAZARD TITLE: The pressurization subsystem can cause or be jeopardized by leaks during test firing of engines and/or the completed booster.

HAZARDOUS CONDITION: Heat exchangers in the pump fed LRB could leak. If leaks exist in the RP-1 heat exchanger, depending upon the direction of flow ,the exhaust could be entrained in the RP-1 pump inlet flow or RP-1 could bleed into the RP-1 tank pressurization line. Entrainment of gas in the incoming fluid could cause pump cavitation and explosion, while RP-1 in the tank pressurization line could cause pressurization anomalies and possible line rupture. If a leak developed in the LO2 heat exchanger, depending upon the direction of flow, LO2 could be entrained in the turbine exhaust or exhaust gas could be entrained in the LO2 pressurization line. If LO2 is mixed with the exhaust gas, it could cause nozzle overheating and possible melting, or possible combustion instabilities. If exhaust gas is entrained in the LO2 pressurization line, frozen carbon dioxide and water ice could form in the LO2 tank, causing loss of pressurization in the tank and possible pressurization line rupture.

HAZARD CAUSE: Leakage in the pump fed heat exchanger(s)

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: The heat exchangers appear to be single failure points. It is therefore essential that leakage be prevented.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Mandatory inspection points

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-W-009 (LRB-P-W-878)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: W - Pressurization Subsystem

DATE: 6 / 23 / 88

HAZARD TITLE: The pressurization subsystem can cause or be jeopardized by propellant characteristics and products during propellant loading for test or flight.

HAZARDOUS CONDITION: Since they are mechanically connected to the LOX feed system, gas generators can be expected to be chilled by conduction of heat into the LOX tank. When operating, the gas generators will be at high temperature. Therefore, they will have to accommodate large changes in temperature and still maintain required mechanical tolerances for proper operation. It may be difficult to design a gas generator which will maintain the required tolerances over this wide range of temperatures. If tolerances are not maintained, off-nominal operation may occur, with effects which cannot be determined at this time. Such anomalous operation may jeopardize the capability of the gas generators to function properly, and thus imperil LRB reliability.

HAZARD CAUSE: Dimensional changes from chilldown to operation temperature of the gas generators.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: If the gas generators cannot tolerate the large dimensional changes from chilldown to operating temperature, they can be isolated with thermal isolators and/or surrounded by purge gas to maintain temperatures suitable for startup.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-W-010 (LRB-P-W-881)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: W - Pressurization Subsystem

DATE: 6 / 23 / 88

HAZARD TITLE: The pressurization subsystem can cause or be jeopardized by propellant characteristics and products during nominal flight from liftoff to LRB burnout.

HAZARDOUS CONDITION: The RP-1 tank pressurant in the pump fed LRB is the gas generator exhaust, which contains mainly carbon dioxide and water, with small amounts of other molecules containing carbon, hydrogen and oxygen. Although the tank pressurant will be nominally hot enough to maintain the water in the vapor state, some water may condense in RP-1 that will have been cooled by conduction to the oxygen tank before engine start. Condensed water, being heavier than RP-1, will migrate to the tank outlet and will be entrained in the fuel flow to the engines. If the engines are not designed for this condition, combustion instabilities could occur.

HAZARD CAUSE: Entrained water from the gas generator exhaust

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: The maximum amount of water entrained must be calculated and the propulsion system must be designed to tolerate the water in the system.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Engineering analysis and functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-X-001 (LRB-P-X-532)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: X - Personnel

DATE: 6 / 15 / 88

HAZARD TITLE: Personnel can cause or be jeopardized by hazardous environments during proof test of pressure vessels and structure.

HAZARDOUS CONDITION: The current plan is to proof test pressure tanks hydrostatically. This method avoids the release of energy which represents the work done to pressurize the tanks with a compressable fluid. However, proof testing of the LRB pressure vessels, especially the pressurization tank in the pressure fed version, may require much higher pressures than working pressure due to the requirement to verify structural integrity of tanks designed for bending loads. Work put into the tank will appear as strain energy which would be released in the event of a tank rupture. Due to the modulus of aluminum, this strain energy may be great enough to pose a hazard when released.

HAZARD CAUSE: Work put into tanks during proof test.

HAZARD EFFECT: Public emergency

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: The maximum strain energy in the tanks during proof load should be calculated and safe distances should be calculated on the assumption that this energy would be released if the tanks fail. Consideration should also be given to the destructive effects of the column of pressurization fluid which might suddenly be released. See also hazard analysis G-532.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Provides appropriate safety devices

VERIFICATION METHODS: Facilities layout and design

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-X-002 (LRB-P-X-555)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: X - Personnel

DATE: 6 / 15 / 88

HAZARD TITLE: Personnel can cause or be jeopardized by worker overload during inspection and test of the LRB and subsystems.

HAZARDOUS CONDITION: The increased complexity of the LRB will require a much greater workload to inspect all of its systems. The current tendency is to reduce contract cost by reducing the number of support personnel. This frequently results in workers being taxed to the limit of human endurance. The imposition of greater responsibilities may cause hazardous worker overload and consequent hazards due to stress, errors in judgement, mistakes, or fatigue.

HAZARD CAUSE: Increased worker load caused by LRB complexity

HAZARD EFFECT: Personnel injury, damage to flight hardware, loss of mission, or loss of STS vehicle due to improper inspection

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Additional personnel will be required for LRB inspection. This must be taken into consideration in awarding the inspection and/or launch support contract(s), which should specify the minimum number of workers required and the maximum number of hours per shift any worker could be permitted to work without a two-shift break on any given task.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Appropriate worker safety should be specified by the contract provisions noted.

VERIFICATION METHODS: Operation and maintenance instructions

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-X-003 (LRB-P-X-688)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: X - Personnel

DATE: 6 / 15 / 88

HAZARD TITLE: Personnel can cause or be jeopardized by heat sources during launch abort activities, including mission postponement (scrub).

HAZARDOUS CONDITION: Currently, the greatest heat loading on the pad which can occur prior to flight is the heat from the SSMEs before SRB ignition. Significantly greater heat loads can be expected if a launch is terminated after LRB ignition but before liftoff. This additional heating may jeopardize workers who must enter the immediate vicinity of the STS vehicle after scrub (such as those assisting egress of the crew). This hazard is analyzed as C-592 with respect to the crew.

HAZARD CAUSE: Additional heat loading to the launch facilities caused by firing of the LRBs prior to a mission abort.

HAZARD EFFECT: Personnel injury

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Determine the maximum heat loading which can be experienced by equipment or facilities affecting workers after a mission abort. If the heat loading is sufficient to cause personnel injury, modify the pad as necessary to provide the necessary protection or provide protective clothing to the workers.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Provides appropriate safety devices or personal protective equipment

VERIFICATION METHODS: Either functional test or certificates of training and equipment issue records, respectively.

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-X-004 (LRB-P-X-747)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: X - Personnel

DATE: 6 / 16 / 88

HAZARD TITLE: Personnel can cause or be jeopardized by electrical system malfunction during inspection and test of the LRB and subsystems.

HAZARDOUS CONDITION: Electrical test instrumentation will be used to verify the operation of electromechanical devices. Malfunction of these instruments could cause inadvertent operation of such devices with possible injury to personnel in the path of travel of moving parts or assemblies.

HAZARD CAUSE: Inadvertent movement of components due to malfunction of test equipment

HAZARD EFFECT: Personnel injury

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: All test procedures in which movement of parts could take place should include appropriate caution and warning instructions to insure that personnel are not in the path of potentially harmful movement.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Operation and maintenance instructions

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-X-005 (LRB-P-X-897)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: X - Personnel

DATE: 6 / 16 / 88

HAZARD TITLE: Personnel can cause or be jeopardized by lightning or electromagnetic discharge during transportation from manufacture to launch site or after recovery.

HAZARDOUS CONDITION: A lightning strike on an LRB on a transporter with rubber tires could electricute a grounded operator touching the LRB or the transporter.

HAZARD CAUSE: Low resistance path formed by an operator touching the LRB during a lightning strike.

HAZARD EFFECT: Personal injury or death.

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: LRBs should not be exposed to conditions during which lightning could occur unless they are securely grounded. If conditions arise where an unusually long period of exposure during transportation causes concern from adverse weather (such as loading or unloading from a barge or railroad car), the transporter should be grounded to a low impedence earth ground.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Provides appropriate safety devices

VERIFICATION METHODS: Operation and maintenance instructions

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-X-006 (LRB-P-X-987)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: X - Personnel

DATE: 6 / 16 / 88

HAZARD TITLE: Personnel can cause or be jeopardized by operator error during inspection and test of the LRB and subsystems.

HAZARDOUS CONDITION: Virtually every test and inspection step is potentially subject to operator error with various undesirable consequences. Many inspection steps are intended to detect and correct what would otherwise become latent defects.

HAZARD CAUSE: Human error during inspection and testing

HAZARD EFFECT: Loss of STS vehicle, damage to equipment or personnel injury

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: The current state of computer technology provides numerous new opportunities to provide computerized backup to human observation. Where inspection or testing steps are critical to proper STS vehicle function or where they are intended to detect a hazardous condition, at least two independent checks should be required. One of these may be an automated procedure, but such procedures should not be relied upon as the sole determination of functionality if a second, independent procedure is possible. This philosophy should be incorporated into the quality assurance plan for the LRB and implemented by appropriate written procedures and training.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Manufacturing process plans

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-Y-001 (LRB-P-Y-568)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: Y - Controls and Displays

DATE: 6 / 17 / 88

HAZARD TITLE: Controls and displays can cause or be jeopardized by worker overload during launch abort activities, including mission postponement (scrub).

HAZARDOUS CONDITION: At the present time, there are no procedures, controls, displays, or software dedicated to safing the vehicle and terminating the launch sequence after SRB ignition. Since safe recovery after LRB ignition is possible, this condition represents a preventable risk. In the event of a shutdown after all engine ignition, vehicle safing cannot be performed.

HAZARD CAUSE: Lack of current procedures for recovery from a scrub after all engine ignition

HAZARD EFFECT: Launch crew injury or death

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: A complete reevaluation of launch crew support requirements should be conducted to determine the additional controls, displays, computer systems, and personnel which will be required as a result of the increased capabilities of the LRB system. Procedures should be developed to exploit this capability for maximum safety.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Institutes effective special procedures

VERIFICATION METHODS: Emergency plans and rehearsals

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-Z-001 (LRB-P-Z-546)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: Z - Caution and Warning Systems

DATE: 6 / 20 / 88

HAZARD TITLE: Caution and warning systems can cause or be jeopardized by hazardous environments during intact abort, including RTLS, TAL, AOA and ATO.

HAZARDOUS CONDITION: The capability of throttling or shutting down the LRB provides more options in the event of a malfunction. There should be several options available (RTLS,TAL,ATO) at any one time for any given anomalous condition. This situation places additional responsibility on the crew, which would already be strained to cope with the flight anomaly, to make a decision concerning which option to take. Currently, caution and warning systems on the STS tend more to tell what is wrong than what to do about it. This situation may overtax the crew by forcing a decision at a critical time. See also C-570.

HAZARD CAUSE: Requirement for crew simultaneously to deal with a flight anomaly and make a decision regarding which contingency option to take.

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Consideration should be given to computer simulation of all credible failure or anomalous conditions. Subsequent complete evaluation of those conditions could determine the best course of action. Appropriate instrumentation should be developed to present this information to the crew in such a manner that, for any given anomaly, the crew would know immediately what contingency option is most likely to result in safe return of the Orbiter and crew.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Provides appropriate safety equipment (display) and special procedures (option to be taken).

VERIFICATION METHODS: STS flight anomaly simulation, training and rehearsals

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-Z-002 (LRB-P-Z-748)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: Z - Caution and Warning Systems

DATE: 6 / 21 / 88

HAZARD TITLE: Caution and warning systems can cause or be jeopardized by electrical system malfunction during proof test of pressure vessels and structure.

HAZARDOUS CONDITION: Because of the wall thickness of LRB tanks, critical flaws may be expected to be smaller than the wall thickness. Therefore, the tanks can be expected to fail by bursting, rather than leaking. This condition will make leak checks of welds invalid as an indication of weld flaws; leak checking of welds may not be required during proof. This situation makes strain guage data much more critical, since anomalous strains may be the only indication of an approach to an overstress condition. If strain guage data is lost through a power supply interruption, it may be impossible to stop the proof test in a safe and controlled manner.

HAZARD CAUSE: Loss of strain guage data due to power supply failure.

HAZARD EFFECT: Damage to flight hardware

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Strain guages and their associated signal conditioners and data handling facilities, should be provided with an uninterruptable power supply (UPS).

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-Z-003 (LRB-P-Z-750)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: Z - Caution and Warning Systems

DATE: 6 / 21 / 88

HAZARD TITLE: Caution and warning systems can cause or be jeopardized by electrical system malfunction during test firing of engines and/or the completed booster.

HAZARDOUS CONDITION: Testing will be accomplished with instrumentation which is intended to detect anomalous conditions and shut the engine(s) down to prevent damage. If power to this instrumentation is lost, the engines could be destroyed due to continued anomalous operation.

HAZARD CAUSE: Failure to shut down engines due to a power failure.

HAZARD EFFECT: Damage to flight hardware

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Provide test instrumentation with uninterruptable power supplies (UPS) and interlock the engine controllers to test instrumentation in such a manner that any loss of power automatically causes the engine controllers to shut down the engines in an orderly manner.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Eliminated by design

VERIFICATION METHODS: Functional test

HAZARD ANALYSIS WORKSHEET

HAZARD REPORT NUMBER: LRB-P-Z-004 (LRB-P-Z-894)

ANALYST/ENGINEER NAME: John H. Lindorfer

SYSTEM: Z - Caution and Warning Systems

DATE: 6 / 21 / 88

HAZARD TITLE: Caution and warning systems can cause or be jeopardized by lightning or electromagnetic discharge during test firing of engines and/or the completed booster.

HAZARDOUS CONDITION: The electromagnetic pulse from a lightning strike on the LRB at any time the vehicle is energized is likely to cause erroneous readings of electrical instrumentation, including caution and warning systems. This condition will take place at the very time that anomalous system operation is likely due to the lightning strike. For this reason, the caution and warning systems can be considered to be incapacitated during their most critical period of operation. Lack of proper caution and warning signals could allow hazardous situations to propagate to an accident without proper preventive or remedial action being taken.

HAZARD CAUSE: Incapacitation of caution and warning systems due to lightning strike

HAZARD EFFECT: Loss of STS vehicle

HAZARD LEVEL: Catastrophic

SAFETY REQUIREMENTS: Caution and warning systems should be made as immune as possible to the effects of lightning. Consideration should be given to mechanical and fluidic instrumentation where it can replace electrical instrumentation for this purpose. Consideration should also be given to fiber optic communications links, which are essentially immune to lightning. This hazard is a candidate residual risk due to the unpredictable nature of lightning.

ELIMINATION/CONTROL/ACCEPTED RISK RATIONALE: Minimized by design

VERIFICATION METHODS: Engineering analysis

(disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-886 - Cryogenic tanks and systems can cause or be jeopardized by propellant characteristics and products during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-887 - Cryogenic tanks and systems can cause or be jeopardized by propellant characteristics and products during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-888 - Cryogenic tanks and systems can cause or be jeopardized by propellant characteristics and products during refurbishment of reusable components. -- This hazard is not credible. (4 13 88)

LRB-P-K-889 - Cryogenic tanks and systems can cause or be jeopardized by lightning or electromagnetic discharge during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (4 13 88)

LRB-P-K-890 - Cryogenic tanks and systems can cause or be jeopardized by lightning or electromagnetic discharge during manufacture and fabrication of subsystems and components. -- This hazard is not credible. (4 13 88)

LRB-P-K-891 - Cryogenic tanks and systems can cause or be jeopardized by lightning or electromagnetic discharge during inspection and test of the LRB and subsystems. -- This hazard is not credible. (4 13 88)

LRB-P-K-892 - Cryogenic tanks and systems can cause or be jeopardized by lightning or electromagnetic discharge during proof test of pressure vessels and structure. -- This hazard is not credible. (4 13 88)

LRB-P-K-893 - Cryogenic tanks and systems can cause or be jeopardized by lightning or electromagnetic discharge during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (4 13 88)

LRB-P-K-894 - Cryogenic tanks and systems can cause or be jeopardized by lightning or electromagnetic discharge during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-895 - Cryogenic tanks and systems can cause or be jeopardized by lightning or electromagnetic discharge during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-896 - Cryogenic tanks and systems can cause or be jeopardized by lightning or electromagnetic discharge during preparation for shipment of the booster and ship loose hardware. -- This hazard is not credible. (4 13 88)

LRB-P-K-897 - Cryogenic tanks and systems can cause or be jeopardized by lightning or electromagnetic discharge during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (4 13 88)

LRB-P-K-898 - Cryogenic tanks and systems can cause or be jeopardized by lightning or electromagnetic discharge during storage, including storage of major components. -- This hazard is not credible. (4 13 88)

LRB-P-K-899 - Cryogenic tanks and systems can cause or be jeopardized by lightning or electromagnetic discharge during preflight checkout prior to stacking. -- This hazard is not credible. (4 13 88)

LRB-P-K-900 - Cryogenic tanks and systems can cause or be jeopardized by lightning or electromagnetic discharge during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (4 13 88)

LRB-P-K-903 - Cryogenic tanks and systems can cause or be jeopardized by lightning or electromagnetic discharge during countdown to liftoff or abort. -- This hazard is analyzed as K-902. (4 13 88)

LRB-P-K-904 - Cryogenic tanks and systems can cause or be jeopardized by lightning or electromagnetic discharge during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as K-902. (4 13 88)

LRB-P-K-905 - Cryogenic tanks and systems can cause or be jeopardized by lightning or electromagnetic discharge during nominal flight from liftoff to LRB burnout. -- This hazard is analyzed as K-901. (4 13 88)

LRB-P-K-906 - Cryogenic tanks and systems can cause or be jeopardized by lightning or electromagnetic discharge during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-907 - Cryogenic tanks and systems can cause or be jeopardized by lightning or electromagnetic discharge during separation of the LRB from the STS vehicle. -- At separation altitude, lightning and static electricity do not appear to be credible concerns. (4 13 88)

LRB-P-K-908 - Cryogenic tanks and systems can cause or be jeopardized by lightning or electromagnetic discharge during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-909 - Cryogenic tanks and systems can cause or be jeopardized by lightning or electromagnetic discharge during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-910 - Cryogenic tanks and systems can cause or be jeopardized by lightning or electromagnetic discharge during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-911 - Cryogenic tanks and systems can cause or be jeopardized by lightning or electromagnetic discharge during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-912 - Cryogenic tanks and systems can cause or be jeopardized by lightning or electromagnetic discharge during refurbishment of reusable components. -- This hazard is not credible. (4 13 88)

LRB-P-K-937 - Cryogenic tanks and systems can cause or be jeopardized by chemical activity during component or material purchase, including acquisition of GFP. -- It is assumed that system materials will be compatible with the media contained. (4 13 88)

LRB-P-K-938 - Cryogenic tanks and systems can cause or be jeopardized by chemical activity during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-939 - Cryogenic tanks and systems can cause or be jeopardized by chemical activity during inspection and test of the LRB and subsystems. -- This hazard is analyzed as K-650. (4 13 88)

LRB-P-K-940 - Cryogenic tanks and systems can cause or be jeopardized by chemical activity during proof test of pressure vessels and structure. -- It is assumed that system materials will be compatible with the media contained. (4 13 88)

LRB-P-K-941 - Cryogenic tanks and systems can cause or be jeopardized by chemical activity during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (4 13 88)

LRB-P-K-942 - Cryogenic tanks and systems can cause or be jeopardized by chemical activity during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-944 - Cryogenic tanks and systems can cause or be jeopardized by chemical activity during preparation for shipment of the booster and ship loose

hardware. -- This hazard is not credible. (4 13 88)

LRB-P-K-945 - Cryogenic tanks and systems can cause or be jeopardized by chemical activity during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (4 13 88)

LRB-P-K-946 - Cryogenic tanks and systems can cause or be jeopardized by chemical activity during storage, including storage of major components. -- It is assumed that the storage environment will not be conducive to hazardous chemical activity. (4 13 88)

LRB-P-K-947 - Cryogenic tanks and systems can cause or be jeopardized by chemical activity during preflight checkout prior to stacking. -- This hazard is not credible. (4 13 88)

LRB-P-K-948 - Cryogenic tanks and systems can cause or be jeopardized by chemical activity during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (4 13 88)

LRB-P-K-949 - Cryogenic tanks and systems can cause or be jeopardized by chemical activity during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-950 - Cryogenic tanks and systems can cause or be jeopardized by chemical activity during propellant loading for test or flight. -- It is assumed that cryogenic systems will be chemically compatible with the media contained. (4 13 88)

LRB-P-K-951 - Cryogenic tanks and systems can cause or be jeopardized by chemical activity during countdown to liftoff or abort. -- This hazard is analyzed as K-650. (4 13 88)

LRB-P-K-952 - Cryogenic tanks and systems can cause or be jeopardized by chemical activity during launch abort activities, including mission postponement (scrub). -- It is assumed that cryogenic systems will be chemically compatible with the media contained. (4 13 88)

LRB-P-K-953 - Cryogenic tanks and systems can cause or be jeopardized by chemical activity during nominal flight from liftoff to LRB burnout. -- It is assumed that cryogenic systems will be chemically compatible with the media contained. (4 13 88)

LRB-P-K-954 - Cryogenic tanks and systems can cause or be jeopardized by chemical activity during intact abort, including RTLS, TAL, AOA and ATO. -- It is assumed that cryogenic systems will be chemically compatible with the media contained. (4 13 88)

LRB-P-K-955 - Cryogenic tanks and systems can cause or be jeopardized by

chemical activity during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-956 - Cryogenic tanks and systems can cause or be jeopardized by chemical activity during descent from separation to ocean impact. -- It is assumed that cryogenic systems will be chemically compatible with the media contained. (4 13 88)

LRB-P-K-957 - Cryogenic tanks and systems can cause or be jeopardized by chemical activity during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-958 - Cryogenic tanks and systems can cause or be jeopardized by chemical activity during floatation (of recoverable boosters) until recovery. -- It is assumed that recoverable boosters will be adequately protected from the damaging effects of seawater. (4 13 88)

LRB-P-K-959 - Cryogenic tanks and systems can cause or be jeopardized by chemical activity during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (4 13 88)

LRB-P-K-960 - Cryogenic tanks and systems can cause or be jeopardized by chemical activity during refurbishment of reusable components. -- This hazard is not credible. (4 13 88)

LRB-P-K-1033 - Cryogenic tanks and systems can cause or be jeopardized by emergencies during component or material purchase, including acquisition of GFP. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-1034 - Cryogenic tanks and systems can cause or be jeopardized by emergencies during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-1035 - Cryogenic tanks and systems can cause or be jeopardized by emergencies during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-1036 - Cryogenic tanks and systems can cause or be jeopardized by emergencies during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-1037 - Cryogenic tanks and systems can cause or be jeopardized by emergencies during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-1038 - Cryogenic tanks and systems can cause or be jeopardized by emergencies during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-1039 - Cryogenic tanks and systems can cause or be jeopardized by emergencies during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-1040 - Cryogenic tanks and systems can cause or be jeopardized by emergencies during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-1041 - Cryogenic tanks and systems can cause or be jeopardized by emergencies during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-1042 - Cryogenic tanks and systems can cause or be jeopardized by emergencies during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-1043 - Cryogenic tanks and systems can cause or be jeopardized by emergencies during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-1044 - Cryogenic tanks and systems can cause or be jeopardized by emergencies during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-1045 - Cryogenic tanks and systems can cause or be jeopardized by emergencies during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-1046 - Cryogenic tanks and systems can cause or be jeopardized by emergencies during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-1047 - Cryogenic tanks and systems can cause or be jeopardized by emergencies during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-1048 - Cryogenic tanks and systems can cause or be jeopardized by emergencies during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-1049 - Cryogenic tanks and systems can cause or be jeopardized by

emergencies during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-1050 - Cryogenic tanks and systems can cause or be jeopardized by emergencies during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-1051 - Cryogenic tanks and systems can cause or be jeopardized by emergencies during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-1052 - Cryogenic tanks and systems can cause or be jeopardized by emergencies during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-1053 - Cryogenic tanks and systems can cause or be jeopardized by emergencies during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-1054 - Cryogenic tanks and systems can cause or be jeopardized by emergencies during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-1055 - Cryogenic tanks and systems can cause or be jeopardized by emergencies during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

LRB-P-K-1056 - Cryogenic tanks and systems can cause or be jeopardized by emergencies during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 13 88)

THESE HAZARDS WERE CONSIDERED BY THE ANALYST BUT WERE NOT FURTHER ANALYZED FOR THE REASONS GIVEN

LRB-P-L-529 - The liquid injection system (if used) can cause or be jeopardized by hazardous environments during component or material purchase, including acquisition of GFP. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-530 - The liquid injection system (if used) can cause or be jeopardized by hazardous environments during manufacture and fabrication of subsystems and components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-531 - The liquid injection system (if used) can cause or be jeopardized by hazardous environments during inspection and test of the LRB and subsystems. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-532 - The liquid injection system (if used) can cause or be jeopardized by hazardous environments during proof test of pressure vessels and structure. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-533 - The liquid injection system (if used) can cause or be jeopardized by hazardous environments during acceptance test and checkout prior to delivery to the Government. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-534 - The liquid injection system (if used) can cause or be jeopardized by hazardous environments during test firing of engines and/or the completed booster. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-535 - The liquid injection system (if used) can cause or be jeopardized by hazardous environments during flight readiness firing (FRF) of the STS vehicle. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-536 - The liquid injection system (if used) can cause or be jeopardized by hazardous environments during preparation for shipment of the booster and ship loose hardware. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-537 - The liquid injection system (if used) can cause or be jeopardized by hazardous environments during transportation from manufacture to launch site or after recovery. -- The current baseline configurations do not show the incorporation of

a liquid injection system. (4 14 88)

LRB-P-L-538 - The liquid injection system (if used) can cause or be jeopardized by hazardous environments during storage, including storage of major components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-539 - The liquid injection system (if used) can cause or be jeopardized by hazardous environments during preflight checkout prior to stacking. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-540 - The liquid injection system (if used) can cause or be jeopardized by hazardous environments during vehicle stacking, including ancillary test activities. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-541 - The liquid injection system (if used) can cause or be jeopardized by hazardous environments during rollout from the VAB and preloading preparation. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-542 - The liquid injection system (if used) can cause or be jeopardized by hazardous environments during propellant loading for test or flight. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-543 - The liquid injection system (if used) can cause or be jeopardized by hazardous environments during countdown to liftoff or abort. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-544 - The liquid injection system (if used) can cause or be jeopardized by hazardous environments during launch abort activities, including mission postponement (scrub). -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-545 - The liquid injection system (if used) can cause or be jeopardized by hazardous environments during nominal flight from liftoff to LRB burnout. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-546 - The liquid injection system (if used) can cause or be jeopardized by hazardous environments during intact abort, including RTLS, TAL, AOA and ATO. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-547 - The liquid injection system (if used) can cause or be jeopardized by hazardous environments during separation of the LRB from the STS vehicle. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-548 - The liquid injection system (if used) can cause or be jeopardized by hazardous environments during descent from separation to ocean impact. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-549 - The liquid injection system (if used) can cause or be jeopardized by hazardous environments during splashdown events occuring at impact (disposable for expendables). -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-550 - The liquid injection system (if used) can cause or be jeopardized by hazardous environments during floatation (of recoverable boosters) until recovery. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-551 - The liquid injection system (if used) can cause or be jeopardized by hazardous environments during recovery activities, including towing, and retrieval of recoverables. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-552 - The liquid injection system (if used) can cause or be jeopardized by hazardous environments during refurbishment of reusable components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-577 - The liquid injection system (if used) can cause or be jeopardized by unsafe or unhygienic working conditions during component or material purchase, including acquisition of GFP. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-578 - The liquid injection system (if used) can cause or be jeopardized by unsafe or unhygienic working conditions during manufacture and fabrication of subsystems and components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-579 - The liquid injection system (if used) can cause or be jeopardized by unsafe or unhygienic working conditions during inspection and test of the LRB and subsystems. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-580 - The liquid injection system (if used) can cause or be jeopardized by

unsafe or unhygienic working conditions during proof test of pressure vessels and structure. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-581 - The liquid injection system (if used) can cause or be jeopardized by unsafe or unhygienic working conditions during acceptance test and checkout prior to delivery to the Government. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-582 - The liquid injection system (if used) can cause or be jeopardized by unsafe or unhygienic working conditions during test firing of engines and/or the completed booster. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-583 - The liquid injection system (if used) can cause or be jeopardized by unsafe or unhygienic working conditions during flight readiness firing (FRF) of the STS vehicle. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-584 - The liquid injection system (if used) can cause or be jeopardized by unsafe or unhygienic working conditions during preparation for shipment of the booster and ship loose hardware. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-585 - The liquid injection system (if used) can cause or be jeopardized by unsafe or unhygienic working conditions during transportation from manufacture to launch site or after recovery. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-586 - The liquid injection system (if used) can cause or be jeopardized by unsafe or unhygienic working conditions during storage, including storage of major components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-587 - The liquid injection system (if used) can cause or be jeopardized by unsafe or unhygienic working conditions during preflight checkout prior to stacking. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-588 - The liquid injection system (if used) can cause or be jeopardized by unsafe or unhygienic working conditions during vehicle stacking, including ancillary test activities. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-589 - The liquid injection system (if used) can cause or be jeopardized by unsafe or unhygienic working conditions during rollout from the VAB and preloading

preparation. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-590 - The liquid injection system (if used) can cause or be jeopardized by unsafe or unhygienic working conditions during propellant loading for test or flight. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-591 - The liquid injection system (if used) can cause or be jeopardized by unsafe or unhygienic working conditions during countdown to liftoff or abort. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-592 - The liquid injection system (if used) can cause or be jeopardized by unsafe or unhygienic working conditions during launch abort activities, including mission postponement (scrub). -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-593 - The liquid injection system (if used) can cause or be jeopardized by unsafe or unhygienic working conditions during nominal flight from liftoff to LRB burnout. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-594 - The liquid injection system (if used) can cause or be jeopardized by unsafe or unhygienic working conditions during intact abort, including RTLS, TAL, AOA and ATO. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-595 - The liquid injection system (if used) can cause or be jeopardized by unsafe or unhygienic working conditions during separation of the LRB from the STS vehicle. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-596 - The liquid injection system (if used) can cause or be jeopardized by unsafe or unhygienic working conditions during descent from separation to ocean impact. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-597 - The liquid injection system (if used) can cause or be jeopardized by unsafe or unhygienic working conditions during splashdown events occuring at impact (disposable for expendables). -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-598 - The liquid injection system (if used) can cause or be jeopardized by unsafe or unhygienic working conditions during floatation (of recoverable boosters) until recovery. -- The current baseline configurations do not show the incorporation of

a liquid injection system. (4 14 88)

LRB-P-L-599 - The liquid injection system (if used) can cause or be jeopardized by unsafe or unhygienic working conditions during recovery activities, including towing, and retrieval of recoverables. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-600 - The liquid injection system (if used) can cause or be jeopardized by unsafe or unhygienic working conditions during refurbishment of reusable components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-649 - The liquid injection system (if used) can cause or be jeopardized by contamination during component or material purchase, including acquisition of GFP. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-650 - The liquid injection system (if used) can cause or be jeopardized by contamination during manufacture and fabrication of subsystems and components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-651 - The liquid injection system (if used) can cause or be jeopardized by contamination during inspection and test of the LRB and subsystems. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-652 - The liquid injection system (if used) can cause or be jeopardized by contamination during proof test of pressure vessels and structure. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-653 - The liquid injection system (if used) can cause or be jeopardized by contamination during acceptance test and checkout prior to delivery to the Government. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-654 - The liquid injection system (if used) can cause or be jeopardized by contamination during test firing of engines and/or the completed booster. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-655 - The liquid injection system (if used) can cause or be jeopardized by contamination during flight readiness firing (FRF) of the STS vehicle. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-656 - The liquid injection system (if used) can cause or be jeopardized by contamination during preparation for shipment of the booster and ship loose hardware. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-657 - The liquid injection system (if used) can cause or be jeopardized by contamination during transportation from manufacture to launch site or after recovery. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-658 - The liquid injection system (if used) can cause or be jeopardized by contamination during storage, including storage of major components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-659 - The liquid injection system (if used) can cause or be jeopardized by contamination during preflight checkout prior to stacking. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-660 - The liquid injection system (if used) can cause or be jeopardized by contamination during vehicle stacking, including ancillary test activities. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-661 - The liquid injection system (if used) can cause or be jeopardized by contamination during rollout from the VAB and preloading preparation. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-662 - The liquid injection system (if used) can cause or be jeopardized by contamination during propellant loading for test or flight. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-663 - The liquid injection system (if used) can cause or be jeopardized by contamination during countdown to liftoff or abort. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-664 - The liquid injection system (if used) can cause or be jeopardized by contamination during launch abort activities, including mission postponement (scrub). -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-665 - The liquid injection system (if used) can cause or be jeopardized by contamination during nominal flight from liftoff to LRB burnout. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-666 - The liquid injection system (if used) can cause or be jeopardized by contamination during intact abort, including RTLS, TAL, AOA and ATO. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-667 - The liquid injection system (if used) can cause or be jeopardized by contamination during separation of the LRB from the STS vehicle. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-668 - The liquid injection system (if used) can cause or be jeopardized by contamination during descent from separation to ocean impact. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-669 - The liquid injection system (if used) can cause or be jeopardized by contamination during splashdown events occuring at impact (disposable for expendables). -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-670 - The liquid injection system (if used) can cause or be jeopardized by contamination during floatation (of recoverable boosters) until recovery. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-671 - The liquid injection system (if used) can cause or be jeopardized by contamination during recovery activities, including towing, and retrieval of recoverables. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-672 - The liquid injection system (if used) can cause or be jeopardized by contamination during refurbishment of reusable components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-673 - The liquid injection system (if used) can cause or be jeopardized by heat sources during component or material purchase, including acquisition of GFP. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-674 - The liquid injection system (if used) can cause or be jeopardized by heat sources during manufacture and fabrication of subsystems and components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-675 - The liquid injection system (if used) can cause or be jeopardized by heat sources during inspection and test of the LRB and subsystems. -- The current

baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-676 - The liquid injection system (if used) can cause or be jeopardized by heat sources during proof test of pressure vessels and structure. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-677 - The liquid injection system (if used) can cause or be jeopardized by heat sources during acceptance test and checkout prior to delivery to the Government. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-678 - The liquid injection system (if used) can cause or be jeopardized by heat sources during test firing of engines and/or the completed booster. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-679 - The liquid injection system (if used) can cause or be jeopardized by heat sources during flight readiness firing (FRF) of the STS vehicle. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-680 - The liquid injection system (if used) can cause or be jeopardized by heat sources during preparation for shipment of the booster and ship loose hardware. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-681 - The liquid injection system (if used) can cause or be jeopardized by heat sources during transportation from manufacture to launch site or after recovery. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-682 - The liquid injection system (if used) can cause or be jeopardized by heat sources during storage, including storage of major components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-683 - The liquid injection system (if used) can cause or be jeopardized by heat sources during preflight checkout prior to stacking. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-684 - The liquid injection system (if used) can cause or be jeopardized by heat sources during vehicle stacking, including ancillary test activities. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-685 - The liquid injection system (if used) can cause or be jeopardized by heat sources during rollout from the VAB and preloading preparation. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-686 - The liquid injection system (if used) can cause or be jeopardized by heat sources during propellant loading for test or flight. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-687 - The liquid injection system (if used) can cause or be jeopardized by heat sources during countdown to liftoff or abort. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-688 - The liquid injection system (if used) can cause or be jeopardized by heat sources during launch abort activities, including mission postponement (scrub). -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-689 - The liquid injection system (if used) can cause or be jeopardized by heat sources during nominal flight from liftoff to LRB burnout. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-690 - The liquid injection system (if used) can cause or be jeopardized by heat sources during intact abort, including RTLS, TAL, AOA and ATO. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-691 - The liquid injection system (if used) can cause or be jeopardized by heat sources during separation of the LRB from the STS vehicle. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-692 - The liquid injection system (if used) can cause or be jeopardized by heat sources during descent from separation to ocean impact. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-693 - The liquid injection system (if used) can cause or be jeopardized by heat sources during splashdown events occuring at impact (disposable for expendables). -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-694 - The liquid injection system (if used) can cause or be jeopardized by heat sources during floatation (of recoverable boosters) until recovery. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-695 - The liquid injection system (if used) can cause or be jeopardized by heat sources during recovery activities, including towing, and retrieval of recoverables. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-696 - The liquid injection system (if used) can cause or be jeopardized by heat sources during refurbishment of reusable components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-721 - The liquid injection system (if used) can cause or be jeopardized by moisture or precipitation during component or material purchase, including acquisition of GFP. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-722 - The liquid injection system (if used) can cause or be jeopardized by moisture or precipitation during manufacture and fabrication of subsystems and components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-723 - The liquid injection system (if used) can cause or be jeopardized by moisture or precipitation during inspection and test of the LRB and subsystems. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-724 - The liquid injection system (if used) can cause or be jeopardized by moisture or precipitation during proof test of pressure vessels and structure. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-725 - The liquid injection system (if used) can cause or be jeopardized by moisture or precipitation during acceptance test and checkout prior to delivery to the Government. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-726 - The liquid injection system (if used) can cause or be jeopardized by moisture or precipitation during test firing of engines and/or the completed booster. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-727 - The liquid injection system (if used) can cause or be jeopardized by moisture or precipitation during flight readiness firing (FRF) of the STS vehicle. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-728 - The liquid injection system (if used) can cause or be jeopardized by moisture or precipitation during preparation for shipment of the booster and ship

loose hardware. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-729 - The liquid injection system (if used) can cause or be jeopardized by moisture or precipitation during transportation from manufacture to launch site or after recovery. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-730 - The liquid injection system (if used) can cause or be jeopardized by moisture or precipitation during storage, including storage of major components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-731 - The liquid injection system (if used) can cause or be jeopardized by moisture or precipitation during preflight checkout prior to stacking. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-732 - The liquid injection system (if used) can cause or be jeopardized by moisture or precipitation during vehicle stacking, including ancillary test activities. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-733 - The liquid injection system (if used) can cause or be jeopardized by moisture or precipitation during rollout from the VAB and preloading preparation. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-734 - The liquid injection system (if used) can cause or be jeopardized by moisture or precipitation during propellant loading for test or flight. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-735 - The liquid injection system (if used) can cause or be jeopardized by moisture or precipitation during countdown to liftoff or abort. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-736 - The liquid injection system (if used) can cause or be jeopardized by moisture or precipitation during launch abort activities, including mission postponement (scrub). -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-737 - The liquid injection system (if used) can cause or be jeopardized by moisture or precipitation during nominal flight from liftoff to LRB burnout. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-738 - The liquid injection system (if used) can cause or be jeopardized by moisture or precipitation during intact abort, including RTLS, TAL, AOA and ATO. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-739 - The liquid injection system (if used) can cause or be jeopardized by moisture or precipitation during separation of the LRB from the STS vehicle. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-740 - The liquid injection system (if used) can cause or be jeopardized by moisture or precipitation during descent from separation to ocean impact. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-741 - The liquid injection system (if used) can cause or be jeopardized by moisture or precipitation during splashdown events occuring at impact (disposable for expendables). -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-742 - The liquid injection system (if used) can cause or be jeopardized by moisture or precipitation during floatation (of recoverable boosters) until recovery. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-743 - The liquid injection system (if used) can cause or be jeopardized by moisture or precipitation during recovery activities, including towing, and retrieval of recoverables. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-744 - The liquid injection system (if used) can cause or be jeopardized by moisture or precipitation during refurbishment of reusable components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-745 - The liquid injection system (if used) can cause or be jeopardized by electrical system malfunction during component or material purchase, including acquisition of GFP. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-746 - The liquid injection system (if used) can cause or be jeopardized by electrical system malfunction during manufacture and fabrication of subsystems and components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-747 - The liquid injection system (if used) can cause or be jeopardized by

electrical system malfunction during inspection and test of the LRB and subsystems. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-748 - The liquid injection system (if used) can cause or be jeopardized by electrical system malfunction during proof test of pressure vessels and structure. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-749 - The liquid injection system (if used) can cause or be jeopardized by electrical system malfunction during acceptance test and checkout prior to delivery to the Government. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-750 - The liquid injection system (if used) can cause or be jeopardized by electrical system malfunction during test firing of engines and/or the completed booster. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-751 - The liquid injection system (if used) can cause or be jeopardized by electrical system malfunction during flight readiness firing (FRF) of the STS vehicle. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-752 - The liquid injection system (if used) can cause or be jeopardized by electrical system malfunction during preparation for shipment of the booster and ship loose hardware. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-753 - The liquid injection system (if used) can cause or be jeopardized by electrical system malfunction during transportation from manufacture to launch site or after recovery. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-754 - The liquid injection system (if used) can cause or be jeopardized by electrical system malfunction during storage, including storage of major components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-755 - The liquid injection system (if used) can cause or be jeopardized by electrical system malfunction during preflight checkout prior to stacking. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-756 - The liquid injection system (if used) can cause or be jeopardized by electrical system malfunction during vehicle stacking, including ancillary test

activities. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-757 - The liquid injection system (if used) can cause or be jeopardized by electrical system malfunction during rollout from the VAB and preloading preparation. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-758 - The liquid injection system (if used) can cause or be jeopardized by electrical system malfunction during propellant loading for test or flight. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-759 - The liquid injection system (if used) can cause or be jeopardized by electrical system malfunction during countdown to liftoff or abort. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-760 - The liquid injection system (if used) can cause or be jeopardized by electrical system malfunction during launch abort activities, including mission postponement (scrub). -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-761 - The liquid injection system (if used) can cause or be jeopardized by electrical system malfunction during nominal flight from liftoff to LRB burnout. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-762 - The liquid injection system (if used) can cause or be jeopardized by electrical system malfunction during intact abort, including RTLS, TAL, AOA and ATO. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-763 - The liquid injection system (if used) can cause or be jeopardized by electrical system malfunction during separation of the LRB from the STS vehicle. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-764 - The liquid injection system (if used) can cause or be jeopardized by electrical system malfunction during descent from separation to ocean impact. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-765 - The liquid injection system (if used) can cause or be jeopardized by electrical system malfunction during splashdown events occuring at impact (disposable for expendables). -- The current baseline configurations do not show the

incorporation of a liquid injection system. (4 14 88)

LRB-P-L-766 - The liquid injection system (if used) can cause or be jeopardized by electrical system malfunction during floatation (of recoverable boosters) until recovery. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-767 - The liquid injection system (if used) can cause or be jeopardized by electrical system malfunction during recovery activities, including towing, and retrieval of recoverables. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-768 - The liquid injection system (if used) can cause or be jeopardized by electrical system malfunction during refurbishment of reusable components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-769 - The liquid injection system (if used) can cause or be jeopardized by differential pressure during component or material purchase, including acquisition of GFP. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-770 - The liquid injection system (if used) can cause or be jeopardized by differential pressure during manufacture and fabrication of subsystems and components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-771 - The liquid injection system (if used) can cause or be jeopardized by differential pressure during inspection and test of the LRB and subsystems. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-772 - The liquid injection system (if used) can cause or be jeopardized by differential pressure during proof test of pressure vessels and structure. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-773 - The liquid injection system (if used) can cause or be jeopardized by differential pressure during acceptance test and checkout prior to delivery to the Government. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-774 - The liquid injection system (if used) can cause or be jeopardized by differential pressure during test firing of engines and/or the completed booster. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-775 - The liquid injection system (if used) can cause or be jeopardized by differential pressure during flight readiness firing (FRF) of the STS vehicle. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-776 - The liquid injection system (if used) can cause or be jeopardized by differential pressure during preparation for shipment of the booster and ship loose hardware. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-777 - The liquid injection system (if used) can cause or be jeopardized by differential pressure during transportation from manufacture to launch site or after recovery. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-778 - The liquid injection system (if used) can cause or be jeopardized by differential pressure during storage, including storage of major components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-779 - The liquid injection system (if used) can cause or be jeopardized by differential pressure during preflight checkout prior to stacking. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-780 - The liquid injection system (if used) can cause or be jeopardized by differential pressure during vehicle stacking, including ancillary test activities. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-781 - The liquid injection system (if used) can cause or be jeopardized by differential pressure during rollout from the VAB and preloading preparation. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-782 - The liquid injection system (if used) can cause or be jeopardized by differential pressure during propellant loading for test or flight. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-783 - The liquid injection system (if used) can cause or be jeopardized by differential pressure during countdown to liftoff or abort. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-784 - The liquid injection system (if used) can cause or be jeopardized by differential pressure during launch abort activities, including mission postponement (scrub). -- The current baseline configurations do not show the incorporation of a

liquid injection system. (4 14 88)

LRB-P-L-785 - The liquid injection system (if used) can cause or be jeopardized by differential pressure during nominal flight from liftoff to LRB burnout. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-786 - The liquid injection system (if used) can cause or be jeopardized by differential pressure during intact abort, including RTLS, TAL, AOA and ATO. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-787 - The liquid injection system (if used) can cause or be jeopardized by differential pressure during separation of the LRB from the STS vehicle. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-788 - The liquid injection system (if used) can cause or be jeopardized by differential pressure during descent from separation to ocean impact. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-789 - The liquid injection system (if used) can cause or be jeopardized by differential pressure during splashdown events occuring at impact (disposable for expendables). -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-790 - The liquid injection system (if used) can cause or be jeopardized by differential pressure during floatation (of recoverable boosters) until recovery. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-791 - The liquid injection system (if used) can cause or be jeopardized by differential pressure during recovery activities, including towing, and retrieval of recoverables. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-792 - The liquid injection system (if used) can cause or be jeopardized by differential pressure during refurbishment of reusable components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-793 - The liquid injection system (if used) can cause or be jeopardized by vibration, acoustic loads or shock during component or material purchase, including acquisition of GFP. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-794 - The liquid injection system (if used) can cause or be jeopardized by vibration, acoustic loads or shock during manufacture and fabrication of subsystems and components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-795 - The liquid injection system (if used) can cause or be jeopardized by vibration, acoustic loads or shock during inspection and test of the LRB and subsystems. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-796 - The liquid injection system (if used) can cause or be jeopardized by vibration, acoustic loads or shock during proof test of pressure vessels and structure. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-797 - The liquid injection system (if used) can cause or be jeopardized by vibration, acoustic loads or shock during acceptance test and checkout prior to delivery to the Government. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-798 - The liquid injection system (if used) can cause or be jeopardized by vibration, acoustic loads or shock during test firing of engines and/or the completed booster. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-799 - The liquid injection system (if used) can cause or be jeopardized by vibration, acoustic loads or shock during flight readiness firing (FRF) of the STS vehicle. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-800 - The liquid injection system (if used) can cause or be jeopardized by vibration, acoustic loads or shock during preparation for shipment of the booster and ship loose hardware. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-801 - The liquid injection system (if used) can cause or be jeopardized by vibration, acoustic loads or shock during transportation from manufacture to launch site or after recovery. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-802 - The liquid injection system (if used) can cause or be jeopardized by vibration, acoustic loads or shock during storage, including storage of major components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-803 - The liquid injection system (if used) can cause or be jeopardized by

vibration, acoustic loads or shock during preflight checkout prior to stacking. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-804 - The liquid injection system (if used) can cause or be jeopardized by vibration, acoustic loads or shock during vehicle stacking, including ancillary test activities. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-805 - The liquid injection system (if used) can cause or be jeopardized by vibration, acoustic loads or shock during rollout from the VAB and preloading preparation. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-806 - The liquid injection system (if used) can cause or be jeopardized by vibration, acoustic loads or shock during propellant loading for test or flight. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-807 - The liquid injection system (if used) can cause or be jeopardized by vibration, acoustic loads or shock during countdown to liftoff or abort. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-808 - The liquid injection system (if used) can cause or be jeopardized by vibration, acoustic loads or shock during launch abort activities, including mission postponement (scrub). -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-809 - The liquid injection system (if used) can cause or be jeopardized by vibration, acoustic loads or shock during nominal flight from liftoff to LRB burnout. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-810 - The liquid injection system (if used) can cause or be jeopardized by vibration, acoustic loads or shock during intact abort, including RTLS, TAL, AOA and ATO. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-811 - The liquid injection system (if used) can cause or be jeopardized by vibration, acoustic loads or shock during separation of the LRB from the STS vehicle. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-812 - The liquid injection system (if used) can cause or be jeopardized by vibration, acoustic loads or shock during descent from separation to ocean impact. --

The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-813 - The liquid injection system (if used) can cause or be jeopardized by vibration, acoustic loads or shock during splashdown events occuring at impact (disposable for expendables). -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-814 - The liquid injection system (if used) can cause or be jeopardized by vibration, acoustic loads or shock during floatation (of recoverable boosters) until recovery. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-815 - The liquid injection system (if used) can cause or be jeopardized by vibration, acoustic loads or shock during recovery activities, including towing, and retrieval of recoverables. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-816 - The liquid injection system (if used) can cause or be jeopardized by vibration, acoustic loads or shock during refurbishment of reusable components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-817 - The liquid injection system (if used) can cause or be jeopardized by structural loads during component or material purchase, including acquisition of GFP. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-818 - The liquid injection system (if used) can cause or be jeopardized by structural loads during manufacture and fabrication of subsystems and components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-819 - The liquid injection system (if used) can cause or be jeopardized by structural loads during inspection and test of the LRB and subsystems. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-820 - The liquid injection system (if used) can cause or be jeopardized by structural loads during proof test of pressure vessels and structure. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-821 - The liquid injection system (if used) can cause or be jeopardized by structural loads during acceptance test and checkout prior to delivery to the Government. -- The current baseline configurations do not show the incorporation of

a liquid injection system. (4 14 88)

LRB-P-L-822 - The liquid injection system (if used) can cause or be jeopardized by structural loads during test firing of engines and/or the completed booster. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-823 - The liquid injection system (if used) can cause or be jeopardized by structural loads during flight readiness firing (FRF) of the STS vehicle. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-824 - The liquid injection system (if used) can cause or be jeopardized by structural loads during preparation for shipment of the booster and ship loose hardware. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-825 - The liquid injection system (if used) can cause or be jeopardized by structural loads during transportation from manufacture to launch site or after recovery. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-826 - The liquid injection system (if used) can cause or be jeopardized by structural loads during storage, including storage of major components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-827 - The liquid injection system (if used) can cause or be jeopardized by structural loads during preflight checkout prior to stacking. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-828 - The liquid injection system (if used) can cause or be jeopardized by structural loads during vehicle stacking, including ancillary test activities. -- The current baseline configurations do nc' show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-829 - The liquid injection system (if used) can cause or be jeopardized by structural loads during rollout from the VAB and preloading preparation. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-830 - The liquid injection system (if used) can cause or be jeopardized by structural loads during propellant loading for test or flight. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-831 - The liquid injection system (if used) can cause or be jeopardized by

structural loads during countdown to liftoff or abort. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-832 - The liquid injection system (if used) can cause or be jeopardized by structural loads during launch abort activities, including mission postponement (scrub). -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-833 - The liquid injection system (if used) can cause or be jeopardized by structural loads during nominal flight from liftoff to LRB burnout. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-834 - The liquid injection system (if used) can cause or be jeopardized by structural loads during intact abort, including RTLS, TAL, AOA and ATO. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-835 - The liquid injection system (if used) can cause or be jeopardized by structural loads during separation of the LRB from the STS vehicle. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-836 - The liquid injection system (if used) can cause or be jeopardized by structural loads during descent from separation to ocean impact. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-837 - The liquid injection system (if used) can cause or be jeopardized by structural loads during splashdown events occuring at impact (disposable for expendables). -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-838 - The liquid injection system (if used) can cause or be jeopardized by structural loads during floatation (of recoverable boosters) until recovery. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-839 - The liquid injection system (if used) can cause or be jeopardized by structural loads during recovery activities, including towing, and retrieval of recoverables. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-840 - The liquid injection system (if used) can cause or be jeopardized by structural loads during refurbishment of reusable components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-841 - The liquid injection system (if used) can cause or be jeopardized by leaks during component or material purchase, including acquisition of GFP. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-842 - The liquid injection system (if used) can cause or be jeopardized by leaks during manufacture and fabrication of subsystems and components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-843 - The liquid injection system (if used) can cause or be jeopardized by leaks during inspection and test of the LRB and subsystems. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-844 - The liquid injection system (if used) can cause or be jeopardized by leaks during proof test of pressure vessels and structure. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-845 - The liquid injection system (if used) can cause or be jeopardized by leaks during acceptance test and checkout prior to delivery to the Government. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-846 - The liquid injection system (if used) can cause or be jeopardized by leaks during test firing of engines and/or the completed booster. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-847 - The liquid injection system (if used) can cause or be jeopardized by leaks during flight readiness firing (FRF) of the STS vehicle. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-848 - The liquid injection system (if used) can cause or be jeopardized by leaks during preparation for shipment of the booster and ship loose hardware. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-849 - The liquid injection system (if used) can cause or be jeopardized by leaks during transportation from manufacture to launch site or after recovery. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-850 - The liquid injection system (if used) can cause or be jeopardized by leaks during storage, including storage of major components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-851 - The liquid injection system (if used) can cause or be jeopardized by leaks during preflight checkout prior to stacking. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-852 - The liquid injection system (if used) can cause or be jeopardized by leaks during vehicle stacking, including ancillary test activities. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-853 - The liquid injection system (if used) can cause or be jeopardized by leaks during rollout from the VAB and preloading preparation. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-854 - The liquid injection system (if used) can cause or be jeopardized by leaks during propellant loading for test or flight. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-855 - The liquid injection system (if used) can cause or be jeopardized by leaks during countdown to liftoff or abort. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-856 - The liquid injection system (if used) can cause or be jeopardized by leaks during launch abort activities, including mission postponement (scrub). -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-857 - The liquid injection system (if used) can cause or be jeopardized by leaks during nominal flight from liftoff to LRB burnout. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-858 - The liquid injection system (if used) can cause or be jeopardized by leaks during intact abort, including RTLS, TAL, AOA and ATO. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-859 - The liquid injection system (if used) can cause or be jeopardized by leaks during separation of the LRB from the STS vehicle. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-860 - The liquid injection system (if used) can cause or be jeopardized by leaks during descent from separation to ocean impact. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-861 - The liquid injection system (if used) can cause or be jeopardized by leaks during splashdown events occuring at impact (disposable for expendables). -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-862 - The liquid injection system (if used) can cause or be jeopardized by leaks during floatation (of recoverable boosters) until recovery. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-863 - The liquid injection system (if used) can cause or be jeopardized by leaks during recovery activities, including towing, and retrieval of recoverables. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-864 - The liquid injection system (if used) can cause or be jeopardized by leaks during refurbishment of reusable components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-865 - The liquid injection system (if used) can cause or be jeopardized by propellant characteristics and products during component or material purchase, including acquisition of GFP. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-866 - The liquid injection system (if used) can cause or be jeopardized by propellant characteristics and products during manufacture and fabrication of subsystems and components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-867 - The liquid injection system (if used) can cause or be jeopardized by propellant characteristics and products during inspection and test of the LRB and subsystems. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-868 - The liquid injection system (if used) can cause or be jeopardized by propellant characteristics and products during proof test of pressure vessels and structure. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-869 - The liquid injection system (if used) can cause or be jeopardized by propellant characteristics and products during acceptance test and checkout prior to delivery to the Government. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-870 - The liquid injection system (if used) can cause or be jeopardized by propellant characteristics and products during test firing of engines and/or the completed booster. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-871 - The liquid injection system (if used) can cause or be jeopardized by propellant characteristics and products during flight readiness firing (FRF) of the STS

vehicle. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-872 - The liquid injection system (if used) can cause or be jeopardized by propellant characteristics and products during preparation for shipment of the booster and ship loose hardware. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-873 - The liquid injection system (if used) can cause or be jeopardized by propellant characteristics and products during transportation from manufacture to launch site or after recovery. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-874 - The liquid injection system (if used) can cause or be jeopardized by propellant characteristics and products during storage, including storage of major components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-875 - The liquid injection system (if used) can cause or be jeopardized by propellant characteristics and products during preflight checkout prior to stacking. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-876 - The liquid injection system (if used) can cause or be jeopardized by propellant characteristics and products during vehicle stacking, including ancillary test activities. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-877 - The liquid injection system (if used) can cause or be jeopardized by propellant characteristics and products during rollout from the VAB and preloading preparation. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-878 - The liquid injection system (if used) can cause or be jeopardized by propellant characteristics and products during propellant loading for test or flight. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-879 - The liquid injection system (if used) can cause or be jeopardized by propellant characteristics and products during countdown to liftoff or abort. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-880 - The liquid injection system (if used) can cause or be jeopardized by propellant characteristics and products during launch abort activities, including mission postponement (scrub). -- The current baseline configurations do not show

the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-881 - The liquid injection system (if used) can cause or be jeopardized by propellant characteristics and products during nominal flight from liftoff to LRB burnout. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-882 - The liquid injection system (if used) can cause or be jeopardized by propellant characteristics and products during intact abort, including RTLS, TAL, AOA and ATO. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-883 - The liquid injection system (if used) can cause or be jeopardized by propellant characteristics and products during separation of the LRB from the STS vehicle. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-884 - The liquid injection system (if used) can cause or be jeopardized by propellant characteristics and products during descent from separation to ocean impact. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-885 - The liquid injection system (if used) can cause or be jeopardized by propellant characteristics and products during splashdown events occuring at impact (disposable for expendables). -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-886 - The liquid injection system (if used) can cause or be jeopardized by propellant characteristics and products during floatation (of recoverable boosters) until recovery. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-887 - The liquid injection system (if used) can cause or be jeopardized by propellant characteristics and products during recovery activities, including towing, and retrieval of recoverables. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-888 - The liquid injection system (if used) can cause or be jeopardized by propellant characteristics and products during refurbishment of reusable components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-889 - The liquid injection system (if used) can cause or be jeopardized by lightning or electromagnetic discharge during component or material purchase, including acquisition of GFP. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-890 - The liquid injection system (if used) can cause or be jeopardized by lightning or electromagnetic discharge during manufacture and fabrication of subsystems and components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-891 - The liquid injection system (if used) can cause or be jeopardized by lightning or electromagnetic discharge during inspection and test of the LRB and subsystems. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-892 - The liquid injection system (if used) can cause or be jeopardized by lightning or electromagnetic discharge during proof test of pressure vessels and structure. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-893 - The liquid injection system (if used) can cause or be jeopardized by lightning or electromagnetic discharge during acceptance test and checkout prior to delivery to the Government. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-894 - The liquid injection system (if used) can cause or be jeopardized by lightning or electromagnetic discharge during test firing of engines and/or the completed booster. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-895 - The liquid injection system (if used) can cause or be jeopardized by lightning or electromagnetic discharge during flight readiness firing (FRF) of the STS vehicle. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-896 - The liquid injection system (if used) can cause or be jeopardized by lightning or electromagnetic discharge during preparation for shipment of the booster and ship loose hardware. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-897 - The liquid injection system (if used) can cause or be jeopardized by lightning or electromagnetic discharge during transportation from manufacture to launch site or after recovery. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-898 - The liquid injection system (if used) can cause or be jeopardized by lightning or electromagnetic discharge during storage, including storage of major components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-899 - The liquid injection system (if used) can cause or be jeopardized by

lightning or electromagnetic discharge during preflight checkout prior to stacking. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-900 - The liquid injection system (if used) can cause or be jeopardized by lightning or electromagnetic discharge during vehicle stacking, including ancillary test activities. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-901 - The liquid injection system (if used) can cause or be jeopardized by lightning or electromagnetic discharge during rollout from the VAB and preloading preparation. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-902 - The liquid injection system (if used) can cause or be jeopardized by lightning or electromagnetic discharge during propellant loading for test or flight. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-903 - The liquid injection system (if used) can cause or be jeopardized by lightning or electromagnetic discharge during countdown to liftoff or abort. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-904 - The liquid injection system (if used) can cause or be jeopardized by lightning or electromagnetic discharge during launch abort activities, including mission postponement (scrub). -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-905 - The liquid injection system (if used) can cause or be jeopardized by lightning or electromagnetic discharge during nominal flight from liftoff to LRB burnout. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-906 - The liquid injection system (if used) can cause or be jeopardized by lightning or electromagnetic discharge during intact abort, including RTLS, TAL, AOA and ATO. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-907 - The liquid injection system (if used) can cause or be jeopardized by lightning or electromagnetic discharge during separation of the LRB from the STS vehicle. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-908 - The liquid injection system (if used) can cause or be jeopardized by lightning or electromagnetic discharge during descent from separation to ocean

impact. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-909 - The liquid injection system (if used) can cause or be jeopardized by lightning or electromagnetic discharge during splashdown events occuring at impact (disposable for expendables). -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-910 - The liquid injection system (if used) can cause or be jeopardized by lightning or electromagnetic discharge during floatation (of recoverable boosters) until recovery. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-911 - The liquid injection system (if used) can cause or be jeopardized by lightning or electromagnetic discharge during recovery activities, including towing, and retrieval of recoverables. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-912 - The liquid injection system (if used) can cause or be jeopardized by lightning or electromagnetic discharge during refurbishment of reusable components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-937 - The liquid injection system (if used) can cause or be jeopardized by chemical activity during component or material purchase, including acquisition of GFP. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-938 - The liquid injection system (if used) can cause or be jeopardized by chemical activity during manufacture and fabrication of subsystems and components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-939 - The liquid injection system (if used) can cause or be jeopardized by chemical activity during inspection and test of the LRB and subsystems. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-940 - The liquid injection system (if used) can cause or be jeopardized by chemical activity during proof test of pressure vessels and structure. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-941 - The liquid injection system (if used) can cause or be jeopardized by chemical activity during acceptance test and checkout prior to delivery to the Government. -- The current baseline configurations do not show the incorporation of

a liquid injection system. (4 14 88)

LRB-P-L-942 - The liquid injection system (if used) can cause or be jeopardized by chemical activity during test firing of engines and/or the completed booster. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-943 - The liquid injection system (if used) can cause or be jeopardized by chemical activity during flight readiness firing (FRF) of the STS vehicle. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-944 - The liquid injection system (if used) can cause or be jeopardized by chemical activity during preparation for shipment of the booster and ship loose hardware. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-945 - The liquid injection system (if used) can cause or be jeopardized by chemical activity during transportation from manufacture to launch site or after recovery. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-946 - The liquid injection system (if used) can cause or be jeopardized by chemical activity during storage, including storage of major components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-947 - The liquid injection system (if used) can cause or be jeopardized by chemical activity during preflight checkout prior to stacking. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-948 - The liquid injection system (if used) can cause or be jeopardized by chemical activity during vehicle stacking, including ancillary test activities. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-949 - The liquid injection system (if used) can cause or be jeopardized by chemical activity during rollout from the VAB and preloading preparation. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-950 - The liquid injection system (if used) can cause or be jeopardized by chemical activity during propellant loading for test or flight. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-951 - The liquid injection system (if used) can cause or be jeopardized by

chemical activity during countdown to liftoff or abort. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-952 - The liquid injection system (if used) can cause or be jeopardized by chemical activity during launch abort activities, including mission postponement (scrub). -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-953 - The liquid injection system (if used) can cause or be jeopardized by chemical activity during nominal flight from liftoff to LRB burnout. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-954 - The liquid injection system (if used) can cause or be jeopardized by chemical activity during intact abort, including RTLS, TAL, AOA and ATO. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-955 - The liquid injection system (if used) can cause or be jeopardized by chemical activity during separation of the LRB from the STS vehicle. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-956 - The liquid injection system (if used) can cause or be jeopardized by chemical activity during descent from separation to ocean impact. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-957 - The liquid injection system (if used) can cause or be jeopardized by chemical activity during splashdown events occuring at impact (disposable for expendables). -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-958 - The liquid injection system (if used) can cause or be jeopardized by chemical activity during floatation (of recoverable boosters) until recovery. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-959 - The liquid injection system (if used) can cause or be jeopardized by chemical activity during recovery activities, including towing, and retrieval of recoverables. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-960 - The liquid injection system (if used) can cause or be jeopardized by chemical activity during refurbishment of reusable components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-961 - The liquid injection system (if used) can cause or be jeopardized by computer system malfunction during component or material purchase, including acquisition of GFP. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-962 - The liquid injection system (if used) can cause or be jeopardized by computer system malfunction during manufacture and fabrication of subsystems and components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-963 - The liquid injection system (if used) can cause or be jeopardized by computer system malfunction during inspection and test of the LRB and subsystems. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-964 - The liquid injection system (if used) can cause or be jeopardized by computer system malfunction during proof test of pressure vessels and structure. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-965 - The liquid injection system (if used) can cause or be jeopardized by computer system malfunction during acceptance test and checkout prior to delivery to the Government. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-966 - The liquid injection system (if used) can cause or be jeopardized by computer system malfunction during test firing of engines and/or the completed booster. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-967 - The liquid injection system (if used) can cause or be jeopardized by computer system malfunction during flight readiness firing (FRF) of the STS vehicle. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-968 - The liquid injection system (if used) can cause or be jeopardized by computer system malfunction during preparation for shipment of the booster and ship loose hardware. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-969 - The liquid injection system (if used) can cause or be jeopardized by computer system malfunction during transportation from manufacture to launch site or after recovery. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-970 - The liquid injection system (if used) can cause or be jeopardized by

computer system malfunction during storage, including storage of major components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-971 - The liquid injection system (if used) can cause or be jeopardized by computer system malfunction during preflight checkout prior to stacking. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-972 - The liquid injection system (if used) can cause or be jeopardized by computer system malfunction during vehicle stacking, including ancillary test activities. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-973 - The liquid injection system (if used) can cause or be jeopardized by computer system malfunction during rollout from the VAB and preloading preparation. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-974 - The liquid injection system (if used) can cause or be jeopardized by computer system malfunction during propellant loading for test or flight. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-975 - The liquid injection system (if used) can cause or be jeopardized by computer system malfunction during countdown to liftoff or abort. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-976 - The liquid injection system (if used) can cause or be jeopardized by computer system malfunction during launch abort activities, including mission postponement (scrub). -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-977 - The liquid injection system (if used) can cause or be jeopardized by computer system malfunction during nominal flight from liftoff to LRB burnout. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-978 - The liquid injection system (if used) can cause or be jeopardized by computer system malfunction during intact abort, including RTLS, TAL, AOA and ATO. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-979 - The liquid injection system (if used) can cause or be jeopardized by computer system malfunction during separation of the LRB from the STS vehicle. --

The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-980 - The liquid injection system (if used) can cause or be jeopardized by computer system malfunction during descent from separation to ocean impact. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-981 - The liquid injection system (if used) can cause or be jeopardized by computer system malfunction during splashdown events occuring at impact (disposable for expendables). -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-982 - The liquid injection system (if used) can cause or be jeopardized by computer system malfunction during floatation (of recoverable boosters) until recovery. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-983 - The liquid injection system (if used) can cause or be jeopardized by computer system malfunction during recovery activities, including towing, and retrieval of recoverables. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-984 - The liquid injection system (if used) can cause or be jeopardized by computer system malfunction during refurbishment of reusable components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-1033 - The liquid injection system (if used) can cause or be jeopardized by emergencies during component or material purchase, including acquisition of GFP. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-1034 - The liquid injection system (if used) can cause or be jeopardized by emergencies during manufacture and fabrication of subsystems and components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-1035 - The liquid injection system (if used) can cause or be jeopardized by emergencies during inspection and test of the LRB and subsystems. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-1036 - The liquid injection system (if used) can cause or be jeopardized by emergencies during proof test of pressure vessels and structure. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-1037 - The liquid injection system (if used) can cause or be jeopardized by emergencies during acceptance test and checkout prior to delivery to the Government. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-1038 - The liquid injection system (if used) can cause or be jeopardized by emergencies during test firing of engines and/or the completed booster. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-1039 - The liquid injection system (if used) can cause or be jeopardized by emergencies during flight readiness firing (FRF) of the STS vehicle. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-1040 - The liquid injection system (if used) can cause or be jeopardized by emergencies during preparation for shipment of the booster and ship loose hardware. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-1041 - The liquid injection system (if used) can cause or be jeopardized by emergencies during transportation from manufacture to launch site or after recovery. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-1042 - The liquid injection system (if used) can cause or be jeopardized by emergencies during storage, including storage of major components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-1043 - The liquid injection system (if used) can cause or be jeopardized by emergencies during preflight checkout prior to stacking. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-1044 - The liquid injection system (if used) can cause or be jeopardized by emergencies during vehicle stacking, including ancillary test activities. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-1045 - The liquid injection system (if used) can cause or be jeopardized by emergencies during rollout from the VAB and preloading preparation. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-1046 - The liquid injection system (if used) can cause or be jeopardized by emergencies during propellant loading for test or flight. -- The current baseline

configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-1047 - The liquid injection system (if used) can cause or be jeopardized by emergencies during countdown to liftoff or abort. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-1048 - The liquid injection system (if used) can cause or be jeopardized by emergencies during launch abort activities, including mission postponement (scrub). -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-1049 - The liquid injection system (if used) can cause or be jeopardized by emergencies during nominal flight from liftoff to LRB burnout. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-1050 - The liquid injection system (if used) can cause or be jeopardized by emergencies during intact abort, including RTLS, TAL, AOA and ATO. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-1051 - The liquid injection system (if used) can cause or be jeopardized by emergencies during separation of the LRB from the STS vehicle. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-1052 - The liquid injection system (if used) can cause or be jeopardized by emergencies during descent from separation to ocean impact. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-1053 - The liquid injection system (if used) can cause or be jeopardized by emergencies during splashdown events occuring at impact (disposable for expendables). -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-1054 - The liquid injection system (if used) can cause or be jeopardized by emergencies during floatation (of recoverable boosters) until recovery. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-1055 - The liquid injection system (if used) can cause or be jeopardized by emergencies during recovery activities, including towing, and retrieval of recoverables. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

LRB-P-L-1056 - The liquid injection system (if used) can cause or be jeopardized by

emergencies during refurbishment of reusable components. -- The current baseline configurations do not show the incorporation of a liquid injection system. (4 14 88)

THESE HAZARDS WERE CONSIDERED BY THE ANALYST BUT WERE NOT FURTHER ANALYZED FOR THE REASONS GIVEN

LRB-P-M-578 - Engines and/or controllers can cause or be jeopardized by unsafe or unhygienic working conditions during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-579 - Engines and/or controllers can cause or be jeopardized by unsafe or unhygienic working conditions during inspection and test of the LRB and subsystems. -- This hazard is analyzed as G-001 and I-006. (4 15 88)

LRB-P-M-580 - Engines and/or controllers can cause or be jeopardized by unsafe or unhygienic working conditions during proof test of pressure vessels and structure. -- This hazard is analyzed as G-002. (4 15 88)

LRB-P-M-581 - Engines and/or controllers can cause or be jeopardized by unsafe or unhygienic working conditions during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-582 - Engines and/or controllers can cause or be jeopardized by unsafe or unhygienic working conditions during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-583 - Engines and/or controllers can cause or be jeopardized by unsafe or unhygienic working conditions during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-584 - Engines and/or controllers can cause or be jeopardized by unsafe or unhygienic working conditions during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-585 - Engines and/or controllers can cause or be jeopardized by unsafe or unhygienic working conditions during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-586 - Engines and/or controllers can cause or be jeopardized by unsafe or unhygienic working conditions during storage, including storage of major components. -- This hazard is not credible. (4 15 88)

LRB-P-M-587 - Engines and/or controllers can cause or be jeopardized by unsafe or unhygienic working conditions during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-588 - Engines and/or controllers can cause or be jeopardized by unsafe or unhygienic working conditions during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-589 - Engines and/or controllers can cause or be jeopardized by unsafe or unhygienic working conditions during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-590 - Engines and/or controllers can cause or be jeopardized by unsafe or unhygienic working conditions during propellant loading for test or flight. -- This hazard is analyzed as G-012. (4 15 88)

LRB-P-M-591 - Engines and/or controllers can cause or be jeopardized by unsafe or unhygienic working conditions during countdown to liftoff or abort. -- This hazard is analyzed as G-012. (4 15 88)

LRB-P-M-598 - Engines and/or controllers can cause or be jeopardized by unsafe or unhygienic working conditions during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-599 - Engines and/or controllers can cause or be jeopardized by unsafe or unhygienic working conditions during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-600 - Engines and/or controllers can cause or be jeopardized by unsafe or unhygienic working conditions during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-650 - Engines and/or controllers can cause or be jeopardized by contamination during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-651 - Engines and/or controllers can cause or be jeopardized by contamination during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-652 - Engines and/or controllers can cause or be jeopardized by contamination during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-653 - Engines and/or controllers can cause or be jeopardized by contamination during acceptance test and checkout prior to delivery to the

Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-654 - Engines and/or controllers can cause or be jeopardized by contamination during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-655 - Engines and/or controllers can cause or be jeopardized by contamination during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-656 - Engines and/or controllers can cause or be jeopardized by contamination during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-657 - Engines and/or controllers can cause or be jeopardized by contamination during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-658 - Engines and/or controllers can cause or be jeopardized by contamination during storage, including storage of major components. -- It is assumed that the engines and controllers will be stored in a contamination free environment. (4 15 88)

LRB-P-M-659 - Engines and/or controllers can cause or be jeopardized by contamination during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-660 - Engines and/or controllers can cause or be jeopardized by contamination during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-661 - Engines and/or controllers can cause or be jeopardized by contamination during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-662 - Engines and/or controllers can cause or be jeopardized by contamination during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-663 - Engines and/or controllers can cause or be jeopardized by contamination during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-664 - Engines and/or controllers can cause or be jeopardized by

contamination during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-665 - Engines and/or controllers can cause or be jeopardized by contamination during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-666 - Engines and/or controllers can cause or be jeopardized by contamination during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-667 - Engines and/or controllers can cause or be jeopardized by contamination during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-668 - Engines and/or controllers can cause or be jeopardized by contamination during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-669 - Engines and/or controllers can cause or be jeopardized by contamination during splashdown events occuring at impact (disposable for expendables). -- Seawater is an obvious contaminant, but it is assumed that if the engines are designed to be recoverable, they will be able to withstand the effects of submersion in seawater. (4 15 88)

LRB-P-M-670 - Engines and/or controllers can cause or be jeopardized by contamination during floatation (of recoverable boosters) until recovery. -- See comments for M-670. (4 15 88)

LRB-P-M-671 - Engines and/or controllers can cause or be jeopardized by contamination during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-672 - Engines and/or controllers can cause or be jeopardized by contamination during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-678 - Engines and/or controllers can cause or be jeopardized by heat sources during test firing of engines and/or the completed booster. -- Hazards associated with this condition are analyzed as A-678, A-679, D-535, D-679, J-679, and K-679. (4 15 88)

LRB-P-M-679 - Engines and/or controllers can cause or be jeopardized by heat sources during flight readiness firing (FRF) of the STS vehicle. -- See comments for M-678. (4 15 88)

LRB-P-M-681 - Engines and/or controllers can cause or be jeopardized by heat sources during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-682 - Engines and/or controllers can cause or be jeopardized by heat sources during storage, including storage of major components. -- It is assumed that engines will be stored where they cannot be damaged by heat. (4 15 88)

LRB-P-M-685 - Engines and/or controllers can cause or be jeopardized by heat sources during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-686 - Engines and/or controllers can cause or be jeopardized by heat sources during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-687 - Engines and/or controllers can cause or be jeopardized by heat sources during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-688 - Engines and/or controllers can cause or be jeopardized by heat sources during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-689 - Engines and/or controllers can cause or be jeopardized by heat sources during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-690 - Engines and/or controllers can cause or be jeopardized by heat sources during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-691 - Engines and/or controllers can cause or be jeopardized by heat sources during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-692 - Engines and/or controllers can cause or be jeopardized by heat sources during descent from separation to ocean impact. -- This hazard is not credible. (4 15 88)

LRB-P-M-699 - Engines and/or controllers can cause or be jeopardized by radiation or sunlight during inspection and test of the LRB and subsystems. -- This hazard is not credible. (4 15 88)

LRB-P-M-701 - Engines and/or controllers can cause or be jeopardized by radiation or sunlight during acceptance test and checkout prior to delivery to the Government.

-- This hazard is not credible. (4 15 88)

LRB-P-M-702 - Engines and/or controllers can cause or be jeopardized by radiation or sunlight during test firing of engines and/or the completed booster. -- This hazard is not credible. (4 15 88)

LRB-P-M-703 - Engines and/or controllers can cause or be jeopardized by radiation or sunlight during flight readiness firing (FRF) of the STS vehicle. -- This hazard is not credible. (4 15 88)

LRB-P-M-705 - Engines and/or controllers can cause or be jeopardized by radiation or sunlight during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (4 15 88)

LRB-P-M-708 - Engines and/or controllers can cause or be jeopardized by radiation or sunlight during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (4 15 88)

LRB-P-M-709 - Engines and/or controllers can cause or be jeopardized by radiation or sunlight during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 15 88)

LRB-P-M-710 - Engines and/or controllers can cause or be jeopardized by radiation or sunlight during propellant loading for test or flight. -- This hazard is not credible. (4 15 88)

LRB-P-M-711 - Engines and/or controllers can cause or be jeopardized by radiation or sunlight during countdown to liftoff or abort. -- This hazard is not credible. (4 15 88)

LRB-P-M-712 - Engines and/or controllers can cause or be jeopardized by radiation or sunlight during launch abort activities, including mission postponement (scrub). -- This hazard is not credible. (4 15 88)

LRB-P-M-714 - Engines and/or controllers can cause or be jeopardized by radiation or sunlight during intact abort, including RTLS, TAL, AOA and ATO. -- See comments for M-713. (4 15 88)

LRB-P-M-715 - Engines and/or controllers can cause or be jeopardized by radiation or sunlight during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 15 88)

LRB-P-M-716 - Engines and/or controllers can cause or be jeopardized by radiation or sunlight during descent from separation to ocean impact. -- This hazard is not credible. (4 15 88)

LRB-P-M-717 - Engines and/or controllers can cause or be jeopardized by radiation or sunlight during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 15 88)

LRB-P-M-718 - Engines and/or controllers can cause or be jeopardized by radiation or sunlight during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 15 88)

LRB-P-M-719 - Engines and/or controllers can cause or be jeopardized by radiation or sunlight during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (4 15 88)

LRB-P-M-720 - Engines and/or controllers can cause or be jeopardized by radiation or sunlight during refurbishment of reusable components. -- This hazard is not credible. (4 15 88)

LRB-P-M-724 - Engines and/or controllers can cause or be jeopardized by moisture or precipitation during proof test of pressure vessels and structure. -- This hazard is not credible. (4 15 88)

LRB-P-M-726 - Engines and/or controllers can cause or be jeopardized by moisture or precipitation during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-727 - Engines and/or controllers can cause or be jeopardized by moisture or precipitation during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-730 - Engines and/or controllers can cause or be jeopardized by moisture or precipitation during storage, including storage of major components. -- Storage conditions are assumed to provide a protected environment. (4 15 88)

LRB-P-M-731 - Engines and/or controllers can cause or be jeopardized by moisture or precipitation during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-732 - Engines and/or controllers can cause or be jeopardized by moisture or precipitation during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-733 - Engines and/or controllers can cause or be jeopardized by moisture or precipitation during rollout from the VAB and preloading preparation. -- If rollout is conducted in the rain, this hazard could be similar to M-729. (4 15 88)

LRB-P-M-734 - Engines and/or controllers can cause or be jeopardized by moisture or precipitation during propellant loading for test or flight. -- This hazard is analyzed

as M-729. (4 15 88)

LRB-P-M-735 - Engines and/or controllers can cause or be jeopardized by moisture or precipitation during countdown to liftoff or abort. -- This hazard is analyzed as M-729. (4 15 88)

LRB-P-M-736 - Engines and/or controllers can cause or be jeopardized by moisture or precipitation during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-737 - Engines and/or controllers can cause or be jeopardized by moisture or precipitation during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-738 - Engines and/or controllers can cause or be jeopardized by moisture or precipitation during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-739 - Engines and/or controllers can cause or be jeopardized by moisture or precipitation during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-740 - Engines and/or controllers can cause or be jeopardized by moisture or precipitation during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-741 - Engines and/or controllers can cause or be jeopardized by moisture or precipitation during splashdown events occuring at impact (disposable for expendables). -- It is assumed that recoverable boosters will be protected from the effects of seawater. (4 15 88)

LRB-P-M-742 - Engines and/or controllers can cause or be jeopardized by moisture or precipitation during floatation (of recoverable boosters) until recovery. -- It is assumed that recoverable boosters will be design to withstand the effects of seawater. (4 15 88)

LRB-P-M-743 - Engines and/or controllers can cause or be jeopardized by moisture or precipitation during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-744 - Engines and/or controllers can cause or be jeopardized by moisture or precipitation during refurbishment of reusable components. -- This hazard is not credible. (4 15 88)

LRB-P-M-746 - Engines and/or controllers can cause or be jeopardized by electrical

system malfunction during manufacture and fabrication of subsystems and components. -- This hazard appears to be adequately controlled by testing of the controllers before flight. (4 15 88)

LRB-P-M-747 - Engines and/or controllers can cause or be jeopardized by electrical system malfunction during inspection and test of the LRB and subsystems. -- This hazard is analyzed as E-747. (4 15 88)

LRB-P-M-748 - Engines and/or controllers can cause or be jeopardized by electrical system malfunction during proof test of pressure vessels and structure. -- To the extent that it applies, this hazard is analyzed as G-747. (4 15 88)

LRB-P-M-749 - Engines and/or controllers can cause or be jeopardized by electrical system malfunction during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-750 - Engines and/or controllers can cause or be jeopardized by electrical system malfunction during test firing of engines and/or the completed booster. -- This hazard is analyzed as A-751. (4 15 88)

LRB-P-M-751 - Engines and/or controllers can cause or be jeopardized by electrical system malfunction during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as A-751. (4 15 88)

LRB-P-M-752 - Engines and/or controllers can cause or be jeopardized by electrical system malfunction during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-753 - Engines and/or controllers can cause or be jeopardized by electrical system malfunction during transportation from manufacture to launch site or after recovery. -- This hazard is analyzed as G-753. (4 15 88)

LRB-P-M-754 - Engines and/or controllers can cause or be jeopardized by electrical system malfunction during storage, including storage of major components. -- Storage facility electrical malfunction is or will be the subject of a separate hazard analysis. It is assumed that storage requirements for the completed booster will not be so stringent that there is a significant peril from this hazard. (4 15 88)

LRB-P-M-755 - Engines and/or controllers can cause or be jeopardized by electrical system malfunction during preflight checkout prior to stacking. -- This is essentially the same hazard as that analyzed as E-747. (4 15 88)

LRB-P-M-756 - Engines and/or controllers can cause or be jeopardized by electrical system malfunction during vehicle stacking, including ancillary test activities. -- This

is essentially the same hazard as E-747. (4 15 88)

LRB-P-M-757 - Engines and/or controllers can cause or be jeopardized by electrical system malfunction during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-759 - Engines and/or controllers can cause or be jeopardized by electrical system malfunction during countdown to liftoff or abort. -- This hazard is analyzed as M-758. (4 15 88)

LRB-P-M-760 - Engines and/or controllers can cause or be jeopardized by electrical system malfunction during launch abort activities, including mission postponement (scrub). -- The conditions under which an abort could occur include malfunction of engine controllers. Other credible abort conditions are sufficiently diverse that a precise analysis cannot be accomplished at this time. (4 15 88)

LRB-P-M-761 - Engines and/or controllers can cause or be jeopardized by electrical system malfunction during nominal flight from liftoff to LRB burnout. -- Electrical malfunction of engine controllers will obviously be hazardous. The nature and extent of the consequences of each credible malfunction cannot be determined at this time. One hazard is radiation damage from a nuclear event, which is analyzed as M-713. (4 15 88)

LRB-P-M-762 - Engines and/or controllers can cause or be jeopardized by electrical system malfunction during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-763 - Engines and/or controllers can cause or be jeopardized by electrical system malfunction during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-764 - Engines and/or controllers can cause or be jeopardized by electrical system malfunction during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-765 - Engines and/or controllers can cause or be jeopardized by electrical system malfunction during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-766 - Engines and/or controllers can cause or be jeopardized by electrical system malfunction during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 15 88)

LRB-P-M-767 - Engines and/or controllers can cause or be jeopardized by electrical system malfunction during recovery activities, including towing, and retrieval of

recoverables. -- This hazard is not credible. (4 15 88)

LRB-P-M-768 - Engines and/or controllers can cause or be jeopardized by electrical system malfunction during refurbishment of reusable components. -- This hazard is not credible. (4 15 88)

LRB-P-M-772 - Engines and/or controllers can cause or be jeopardized by differential pressure during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-774 - Engines and/or controllers can cause or be jeopardized by differential pressure during test firing of engines and/or the completed booster. -- This hazard is analyzed as G-774. (4 20 88)

LRB-P-M-775 - Engines and/or controllers can cause or be jeopardized by differential pressure during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-777 - Engines and/or controllers can cause or be jeopardized by differential pressure during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-778 - Engines and/or controllers can cause or be jeopardized by differential pressure during storage, including storage of major components. -- This hazard is not credible. (4 15 88)

LRB-P-M-782 - Engines and/or controllers can cause or be jeopardized by differential pressure during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-783 - Engines and/or controllers can cause or be jeopardized by differential pressure during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-784 - Engines and/or controllers can cause or be jeopardized by differential pressure during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-785 - Engines and/or controllers can cause or be jeopardized by differential pressure during nominal flight from liftoff to LRB burnout. -- By definition, nominal flight would invole no hazardous anomalies. Therefore this hazard is not credible. (4 15 88)

LRB-P-M-787 - Engines and/or controllers can cause or be jeopardized by differential pressure during separation of the LRB from the STS vehicle. -- Because

the booster propellant tanks are self-contained, it appears to be a simple matter to prevent venting until after separation. (4 15 88)

LRB-P-M-788 - Engines and/or controllers can cause or be jeopardized by differential pressure during descent from separation to ocean impact. -- This condition is analyzed as K-788. (4 15 88)

LRB-P-M-789 - Engines and/or controllers can cause or be jeopardized by differential pressure during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-790 - Engines and/or controllers can cause or be jeopardized by differential pressure during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-791 - Engines and/or controllers can cause or be jeopardized by differential pressure during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-798 - Engines and/or controllers can cause or be jeopardized by vibration, acoustic loads or shock during test firing of engines and/or the completed booster. -- It is anticipated that the engines and controllers will be designed for this condition. Jeopardy to avionics is analyzed as A-798. (4 15 88)

LRB-P-M-799 - Engines and/or controllers can cause or be jeopardized by vibration, acoustic loads or shock during flight readiness firing (FRF) of the STS vehicle. -- Acoustic loads have not yet been defined. It seems reasonable to assume that the engines would be designed to withstand the dynamic loads involved. Jeopardy to avionics is analyzed as A-799. See also F-535. (4 15 88)

LRB-P-M-801 - Engines and/or controllers can cause or be jeopardized by vibration, acoustic loads or shock during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (4 15 88)

LRB-P-M-808 - Engines and/or controllers can cause or be jeopardized by vibration, acoustic loads or shock during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-809 - Engines and/or controllers can cause or be jeopardized by vibration, acoustic loads or shock during nominal flight from liftoff to LRB burnout. -- Since this is the design condition, this hazard does not appear to be credible. However, the effects of vibration and shock on the crew are analyzed as C-809. (4 15 88)

LRB-P-M-810 - Engines and/or controllers can cause or be jeopardized by vibration, acoustic loads or shock during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-811 - Engines and/or controllers can cause or be jeopardized by vibration, acoustic loads or shock during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-812 - Engines and/or controllers can cause or be jeopardized by vibration, acoustic loads or shock during descent from separation to ocean impact. -- This hazard is not credible. (4 15 88)

LRB-P-M-813 - Engines and/or controllers can cause or be jeopardized by vibration, acoustic loads or shock during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-815 - Engines and/or controllers can cause or be jeopardized by vibration, acoustic loads or shock during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-820 - Engines and/or controllers can cause or be jeopardized by structural loads during proof test of pressure vessels and structure. -- This hazard is analyzed as G-988. (4 15 88)

LRB-P-M-822 - Engines and/or controllers can cause or be jeopardized by structural loads during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-823 - Engines and/or controllers can cause or be jeopardized by structural loads during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-825 - Engines and/or controllers can cause or be jeopardized by structural loads during transportation from manufacture to launch site or after recovery. -- It seems reasonable to assume that the transporters for the LRBs will be designed not to impart adverse structural loads to the vehicle. (4 15 88)

LRB-P-M-828 - Engines and/or controllers can cause or be jeopardized by structural loads during vehicle stacking, including ancillary test activities. -- If the booster is capable of withstanding the bending loads experienced on the transporter during transportation, it seems reasonable to assume that it will be capable of withstanding all loads involved in vehicle stacking. (4 15 88)

LRB-P-M-829 - Engines and/or controllers can cause or be jeopardized by structural

loads during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 15 88)

LRB-P-M-830 - Engines and/or controllers can cause or be jeopardized by structural loads during propellant loading for test or flight. -- Structural loads associated with cryogenic chilldown must be investigated. This appears to be a normal engineering function. (4 15 88)

LRB-P-M-831 - Engines and/or controllers can cause or be jeopardized by structural loads during countdown to liftoff or abort. -- See comments for M-830. (4 15 88)

LRB-P-M-832 - Engines and/or controllers can cause or be jeopardized by structural loads during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-833 - Engines and/or controllers can cause or be jeopardized by structural loads during nominal flight from liftoff to LRB burnout. -- This is the design condition, therefore this hazard does not appear credible. (4 15 88)

LRB-P-M-834 - Engines and/or controllers can cause or be jeopardized by structural loads during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-835 - Engines and/or controllers can cause or be jeopardized by structural loads during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 15 88)

LRB-P-M-836 - Engines and/or controllers can cause or be jeopardized by structural loads during descent from separation to ocean impact. -- This hazard is not credible. (4 15 88)

LRB-P-M-837 - Engines and/or controllers can cause or be jeopardized by structural loads during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-838 - Engines and/or controllers can cause or be jeopardized by structural loads during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-839 - Engines and/or controllers can cause or be jeopardized by structural loads during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-843 - Engines and/or controllers can cause or be jeopardized by leaks during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-844 - Engines and/or controllers can cause or be jeopardized by leaks during proof test of pressure vessels and structure. -- This hazard is not credible. (4 18 88)

LRB-P-M-845 - Engines and/or controllers can cause or be jeopardized by leaks during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (4 18 88)

LRB-P-M-846 - Engines and/or controllers can cause or be jeopardized by leaks during test firing of engines and/or the completed booster. -- Although any leakage in the engines may be considered hazardous, this appears to be a FMEA item. (4 18 88)

LRB-P-M-847 - Engines and/or controllers can cause or be jeopardized by leaks during flight readiness firing (FRF) of the STS vehicle. -- This appears to be a FMEA item. (4 18 88)

LRB-P-M-849 - Engines and/or controllers can cause or be jeopardized by leaks during transportation from manufacture to launch site or after recovery. -- Leakage in the engines is not likely to be hazardous during this time. (4 18 88)

LRB-P-M-850 - Engines and/or controllers can cause or be jeopardized by leaks during storage, including storage of major components. -- Leakage in the engines is not likely to be hazardous during this time. (4 18 88)

LRB-P-M-851 - Engines and/or controllers can cause or be jeopardized by leaks during preflight checkout prior to stacking. -- Leakage in the engines is not likely to be hazardous during this time. (4 18 88)

LRB-P-M-852 - Engines and/or controllers can cause or be jeopardized by leaks during vehicle stacking, including ancillary test activities. -- Leakage in the engines is not likely to be hazardous during this time. (4 18 88)

LRB-P-M-853 - Engines and/or controllers can cause or be jeopardized by leaks during rollout from the VAB and preloading preparation. -- Leakage in the engines is not likely to be hazardous during this time. (4 18 88)

LRB-P-M-854 - Engines and/or controllers can cause or be jeopardized by leaks during propellant loading for test or flight. -- Any leak can be considered hazardous during this time, primarily because a leak would indicate an engine malfunction. The hazard associated with release of RP-1 into the flame bucket is analyzed as M-592. (4 18 88)

LRB-P-M-855 - Engines and/or controllers can cause or be jeopardized by leaks during countdown to liftoff or abort. -- The comments of M-854 apply. (4 18 88)

LRB-P-M-856 - Engines and/or controllers can cause or be jeopardized by leaks during launch abort activities, including mission postponement (scrub). -- The comments of M-854 apply. (4 18 88)

LRB-P-M-857 - Engines and/or controllers can cause or be jeopardized by leaks during nominal flight from liftoff to LRB burnout. -- Any leakage would indicate an engine malfunction, which would be the chief hazard. Due to the state of engine design maturity, this hazard cannot be adequately analyzed at this time. (4 18 88)

LRB-P-M-858 - Engines and/or controllers can cause or be jeopardized by leaks during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-859 - Engines and/or controllers can cause or be jeopardized by leaks during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-860 - Engines and/or controllers can cause or be jeopardized by leaks during descent from separation to ocean impact. -- This hazard is not credible. (4 18 88)

LRB-P-M-861 - Engines and/or controllers can cause or be jeopardized by leaks during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 18 88)

LRB-P-M-862 - Engines and/or controllers can cause or be jeopardized by leaks during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 18 88)

LRB-P-M-863 - Engines and/or controllers can cause or be jeopardized by leaks during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (4 18 88)

LRB-P-M-864 - Engines and/or controllers can cause or be jeopardized by leaks during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-894 - Engines and/or controllers can cause or be jeopardized by lightning or electromagnetic discharge during test firing of engines and/or the completed booster. -- It is assumed that tests will not be conducted when there is danger of damage to the booster due to lightning strike. (4 18 88)

LRB-P-M-895 - Engines and/or controllers can cause or be jeopardized by lightning or electromagnetic discharge during flight readiness firing (FRF) of the STS vehicle. -- It is assumed that FRF will not be conducted when there is danger to the booster from lightning strike. (4 18 88)

LRB-P-M-897 - Engines and/or controllers can cause or be jeopardized by lightning or electromagnetic discharge during transportation from manufacture to launch site or after recovery. -- This hazard is evaluated as E-890. (4 18 88)

LRB-P-M-898 - Engines and/or controllers can cause or be jeopardized by lightning or electromagnetic discharge during storage, including storage of major components. -- It is assumed that LRB components will be protected from lightning when in storage. (4 18 88)

LRB-P-M-901 - Engines and/or controllers can cause or be jeopardized by lightning or electromagnetic discharge during rollout from the VAB and preloading preparation. -- If the engine controllers can be damaged by lightning, this would be a credible hazard, since the LRB is unprotected from lightning during rollout. However, it does not seem likely that damage from lightning would be a credible hazard for the engine controllers, which are fairly well protected from electromagnetic energy. (4 18 88)

LRB-P-M-902 - Engines and/or controllers can cause or be jeopardized by lightning or electromagnetic discharge during propellant loading for test or flight. -- See comments for M-901. (4 18 88)

LRB-P-M-903 - Engines and/or controllers can cause or be jeopardized by lightning or electromagnetic discharge during countdown to liftoff or abort. -- See comments for M-901. Damage to the engines or controllers does not appear to be credible. (4 18 88)

LRB-P-M-904 - Engines and/or controllers can cause or be jeopardized by lightning or electromagnetic discharge during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-905 - Engines and/or controllers can cause or be jeopardized by lightning or electromagnetic discharge during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-906 - Engines and/or controllers can cause or be jeopardized by lightning or electromagnetic discharge during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-907 - Engines and/or controllers can cause or be jeopardized by lightning or electromagnetic discharge during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 18 88)

LRB-P-M-908 - Engines and/or controllers can cause or be jeopardized by lightning or electromagnetic discharge during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-909 - Engines and/or controllers can cause or be jeopardized by lightning or electromagnetic discharge during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 18 88)

LRB-P-M-910 - Engines and/or controllers can cause or be jeopardized by lightning or electromagnetic discharge during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 18 88)

LRB-P-M-911 - Engines and/or controllers can cause or be jeopardized by lightning or electromagnetic discharge during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-913 - Engines and/or controllers can cause or be jeopardized by faulty documentation during component or material purchase, including acquisition of GFP. -- Faulty specifications appear to be the hazard here. This cannot be analyzed at present. (4 18 88)

LRB-P-M-915 - Engines and/or controllers can cause or be jeopardized by faulty documentation during inspection and test of the LRB and subsystems. -- The hazard here appears to be faulty inspection documentation. This is a problem for manufacturing engineering and is not amenable to hazard analysis. (4 18 88)

LRB-P-M-916 - Engines and/or controllers can cause or be jeopardized by faulty documentation during proof test of pressure vessels and structure. -- The hazard is faulty test documentation. See comments for M-915. (4 18 88)

LRB-P-M-917 - Engines and/or controllers can cause or be jeopardized by faulty documentation during acceptance test and checkout prior to delivery to the Government. -- The hazard is faulty test documentation. See comments for M-915. (4 18 88)

LRB-P-M-918 - Engines and/or controllers can cause or be jeopardized by faulty documentation during test firing of engines and/or the completed booster. -- The hazard is faulty test documentation. See comments for M-915. (4 18 88)

LRB-P-M-919 - Engines and/or controllers can cause or be jeopardized by faulty documentation during flight readiness firing (FRF) of the STS vehicle. -- The hazard is faulty test documentation. See comments for M-915. LPS software hazards are discussed in E-967. (4 18 88)

LRB-P-M-920 - Engines and/or controllers can cause or be jeopardized by faulty documentation during preparation for shipment of the booster and ship loose hardware. -- The hazard is faulty packaging documentation. See comments for M-915. (4 18 88)

LRB-P-M-921 - Engines and/or controllers can cause or be jeopardized by faulty documentation during transportation from manufacture to launch site or after recovery. -- The hazard is faulty shipping documentation. See comments for M-915. (4 18 88)

LRB-P-M-922 - Engines and/or controllers can cause or be jeopardized by faulty documentation during storage, including storage of major components. -- The hazard is faulty storage documentation. See comments for M-915. (4 18 88)

LRB-P-M-923 - Engines and/or controllers can cause or be jeopardized by faulty documentation during preflight checkout prior to stacking. -- The hazard is faulty test documentation. See comments for M-915. (4 18 88)

LRB-P-M-924 - Engines and/or controllers can cause or be jeopardized by faulty documentation during vehicle stacking, including ancillary test activities. -- The hazard is faulty test documentation. See comments for M-915. (4 18 88)

LRB-P-M-925 - Engines and/or controllers can cause or be jeopardized by faulty documentation during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-926 - Engines and/or controllers can cause or be jeopardized by faulty documentation during propellant loading for test or flight. -- The hazard is faulty test documentation. See comments for M-915. The hazard discussed in G-991 is exacerbated by the possibility of faulty documentation. The problem of faulty paperwork appears not to be amenable to hazard analysis. (4 18 88)

LRB-P-M-927 - Engines and/or controllers can cause or be jeopardized by faulty documentation during countdown to liftoff or abort. -- The hazard is faulty countdown instructions. See comments for M-926. (4 18 88)

LRB-P-M-928 - Engines and/or controllers can cause or be jeopardized by faulty documentation during launch abort activities, including mission postponement (scrub). -- See comments for M-926. (4 18 88)

LRB-P-M-929 - Engines and/or controllers can cause or be jeopardized by faulty documentation during nominal flight from liftoff to LRB burnout. -- This hazard appears to be related to faulty instructions such as flight rules or GPC software. GPC errors are discussed in E-977. (4 18 88)

LRB-P-M-930 - Engines and/or controllers can cause or be jeopardized by faulty documentation during intact abort, including RTLS, TAL, AOA and ATO. -- See comments for M-929. (4 18 88)

LRB-P-M-931 - Engines and/or controllers can cause or be jeopardized by faulty documentation during separation of the LRB from the STS vehicle. -- This hazard is

not credible. (4 18 88)

LRB-P-M-935 - Engines and/or controllers can cause or be jeopardized by faulty documentation during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-936 - Engines and/or controllers can cause or be jeopardized by faulty documentation during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-938 - Engines and/or controllers can cause or be jeopardized by chemical activity during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-939 - Engines and/or controllers can cause or be jeopardized by chemical activity during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-940 - Engines and/or controllers can cause or be jeopardized by chemical activity during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-941 - Engines and/or controllers can cause or be jeopardized by chemical activity during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (4 18 88)

LRB-P-M-942 - Engines and/or controllers can cause or be jeopardized by chemical activity during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-943 - Engines and/or controllers can cause or be jeopardized by chemical activity during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-944 - Engines and/or controllers can cause or be jeopardized by chemical activity during preparation for shipment of the booster and ship loose hardware. -- This hazard is not credible. (4 18 88)

LRB-P-M-945 - Engines and/or controllers can cause or be jeopardized by chemical activity during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (4 18 88)

LRB-P-M-946 - Engines and/or controllers can cause or be jeopardized by chemical activity during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-947 - Engines and/or controllers can cause or be jeopardized by chemical activity during preflight checkout prior to stacking. -- This hazard is not credible. (4 18 88)

LRB-P-M-948 - Engines and/or controllers can cause or be jeopardized by chemical activity during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-949 - Engines and/or controllers can cause or be jeopardized by chemical activity during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 18 88)

LRB-P-M-950 - Engines and/or controllers can cause or be jeopardized by chemical activity during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-951 - Engines and/or controllers can cause or be jeopardized by chemical activity during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-952 - Engines and/or controllers can cause or be jeopardized by chemical activity during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-953 - Engines and/or controllers can cause or be jeopardized by chemical activity during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-954 - Engines and/or controllers can cause or be jeopardized by chemical activity during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-955 - Engines and/or controllers can cause or be jeopardized by chemical activity during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-956 - Engines and/or controllers can cause or be jeopardized by chemical activity during descent from separation to ocean impact. -- This hazard is not credible. (4 18 88)

LRB-P-M-957 - Engines and/or controllers can cause or be jeopardized by chemical activity during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 18 88)

LRB-P-M-958 - Engines and/or controllers can cause or be jeopardized by chemical activity during floatation (of recoverable boosters) until recovery. -- At the current

state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-959 - Engines and/or controllers can cause or be jeopardized by chemical activity during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-960 - Engines and/or controllers can cause or be jeopardized by chemical activity during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-962 - Engines and/or controllers can cause or be jeopardized by computer system malfunction during manufacture and fabrication of subsystems and components. -- The hazard here is improperly manufactured components produced by computer controlled equipment. This hazard appears adequately to be controlled by normal inspection and testing. (4 18 88)

LRB-P-M-963 - Engines and/or controllers can cause or be jeopardized by computer system malfunction during inspection and test of the LRB and subsystems. -- This hazard is analyzed as E-963. (4 18 88)

LRB-P-M-964 - Engines and/or controllers can cause or be jeopardized by computer system malfunction during proof test of pressure vessels and structure. -- Malfunction of computer controlled equipment in the proof test facility is analyzed as G-748. (4 18 88)

LRB-P-M-965 - Engines and/or controllers can cause or be jeopardized by computer system malfunction during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (4 18 88)

LRB-P-M-966 - Engines and/or controllers can cause or be jeopardized by computer system malfunction during test firing of engines and/or the completed booster. -- See comments for M-967. (4 18 88)

LRB-P-M-967 - Engines and/or controllers can cause or be jeopardized by computer system malfunction during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as E-967. (4 18 88)

LRB-P-M-969 - Engines and/or controllers can cause or be jeopardized by computer system malfunction during transportation from manufacture to launch site or after recovery. -- This hazard is analyzed as G-753. (4 18 88)

LRB-P-M-970 - Engines and/or controllers can cause or be jeopardized by computer system malfunction during storage, including storage of major components. -- If computers are used to monitor storage conditions, this could be potentially hazardous. However, at present this does not appear to be a significant concern. (4 18 88)

LRB-P-M-971 - Engines and/or controllers can cause or be jeopardized by computer system malfunction during preflight checkout prior to stacking. -- This hazard is analyzed as E-747. (4 18 88)

LRB-P-M-972 - Engines and/or controllers can cause or be jeopardized by computer system malfunction during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-973 - Engines and/or controllers can cause or be jeopardized by computer system malfunction during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-974 - Engines and/or controllers can cause or be jeopardized by computer system malfunction during propellant loading for test or flight. -- This hazard is analyzed as E-967. (4 18 88)

LRB-P-M-975 - Engines and/or controllers can cause or be jeopardized by computer system malfunction during countdown to liftoff or abort. -- This hazard is analyzed as E-967. (4 18 88)

LRB-P-M-976 - Engines and/or controllers can cause or be jeopardized by computer system malfunction during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-977 - Engines and/or controllers can cause or be jeopardized by computer system malfunction during nominal flight from liftoff to LRB burnout. -- This hazard is analyzed as E-977. (4 18 88)

LRB-P-M-978 - Engines and/or controllers can cause or be jeopardized by computer system malfunction during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-979 - Engines and/or controllers can cause or be jeopardized by computer system malfunction during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 18 88)

LRB-P-M-980 - Engines and/or controllers can cause or be jeopardized by computer system malfunction during descent from separation to ocean impact. -- This hazard is not credible. (4 18 88)

LRB-P-M-981 - Engines and/or controllers can cause or be jeopardized by computer system malfunction during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 18 88)

LRB-P-M-982 - Engines and/or controllers can cause or be jeopardized by computer system malfunction during floatation (of recoverable boosters) until recovery. -- This

hazard is not credible. (4 18 88)

LRB-P-M-983 - Engines and/or controllers can cause or be jeopardized by computer system malfunction during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (4 18 88)

LRB-P-M-984 - Engines and/or controllers can cause or be jeopardized by computer system malfunction during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-1011 - Engines and/or controllers can cause or be jeopardized by wear during inspection and test of the LRB and subsystems. -- If testing involves operation of turbopumps, the bearing life may be decreased. However, it is assumed that this is a known constraint and would not pose a hazard. (4 18 88)

LRB-P-M-1012 - Engines and/or controllers can cause or be jeopardized by wear during proof test of pressure vessels and structure. -- This hazard is not credible. (4 18 88)

LRB-P-M-1013 - Engines and/or controllers can cause or be jeopardized by wear during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (4 18 88)

LRB-P-M-1014 - Engines and/or controllers can cause or be jeopardized by wear during test firing of engines and/or the completed booster. -- It is assumed that the wear involved in test firing will be taken into consideration in determining the remaining life of the vehicle and its components. (4 18 88)

LRB-P-M-1015 - Engines and/or controllers can cause or be jeopardized by wear during flight readiness firing (FRF) of the STS vehicle. -- It is assumed that the wear involved in test firing will be taken into consideration in determining the remaining life of the vehicle and its components. (4 18 88)

LRB-P-M-1017 - Engines and/or controllers can cause or be jeopardized by wear during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-1020 - Engines and/or controllers can cause or be jeopardized by wear during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (4 18 88)

LRB-P-M-1021 - Engines and/or controllers can cause or be jeopardized by wear during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 18 88)

LRB-P-M-1022 - Engines and/or controllers can cause or be jeopardized by wear

during propellant loading for test or flight. -- This hazard is not credible. (4 18 88)

LRB-P-M-1023 - Engines and/or controllers can cause or be jeopardized by wear during countdown to liftoff or abort. -- This hazard is not credible. (4 18 88)

LRB-P-M-1024 - Engines and/or controllers can cause or be jeopardized by wear during launch abort activities, including mission postponement (scrub). -- It is assumed that the wear involved in any firing will be taken into consideration in determining the remaining life of the vehicle and its components. (4 18 88)

LRB-P-M-1025 - Engines and/or controllers can cause or be jeopardized by wear during nominal flight from liftoff to LRB burnout. -- It is assumed that the wear involved in flight will be taken into consideration in determining the remaining life of the vehicle and its components. (4 18 88)

LRB-P-M-1026 - Engines and/or controllers can cause or be jeopardized by wear during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-1027 - Engines and/or controllers can cause or be jeopardized by wear during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 18 88)

LRB-P-M-1028 - Engines and/or controllers can cause or be jeopardized by wear during descent from separation to ocean impact. -- This hazard is not credible. (4 18 88)

LRB-P-M-1029 - Engines and/or controllers can cause or be jeopardized by wear during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 18 88)

LRB-P-M-1031 - Engines and/or controllers can cause or be jeopardized by wear during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-1032 - Engines and/or controllers can cause or be jeopardized by wear during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-1034 - Engines and/or controllers can cause or be jeopardized by emergencies during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-1035 - Engines and/or controllers can cause or be jeopardized by emergencies during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-1036 - Engines and/or controllers can cause or be jeopardized by emergencies during proof test of pressure vessels and structure. -- This hazard is analyzed as G-748. (4 18 88)

LRB-P-M-1037 - Engines and/or controllers can cause or be jeopardized by emergencies during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (4 18 88)

LRB-P-M-1038 - Engines and/or controllers can cause or be jeopardized by emergencies during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-1039 - Engines and/or controllers can cause or be jeopardized by emergencies during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-1040 - Engines and/or controllers can cause or be jeopardized by emergencies during preparation for shipment of the booster and ship loose hardware. -- This hazard is not credible. (4 18 88)

LRB-P-M-1041 - Engines and/or controllers can cause or be jeopardized by emergencies during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-1042 - Engines and/or controllers can cause or be jeopardized by emergencies during storage, including storage of major components. -- This hazard is not credible. (4 18 88)

LRB-P-M-1043 - Engines and/or controllers can cause or be jeopardized by emergencies during preflight checkout prior to stacking. -- This hazard is not credible. (4 18 88)

LRB-P-M-1044 - Engines and/or controllers can cause or be jeopardized by emergencies during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-1045 - Engines and/or controllers can cause or be jeopardized by emergencies during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-1046 - Engines and/or controllers can cause or be jeopardized by emergencies during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-1047 - Engines and/or controllers can cause or be jeopardized by emergencies during countdown to liftoff or abort. -- At the current state of maturity, this

hazard cannot be evaluated. (4 18 88)

LRB-P-M-1048 - Engines and/or controllers can cause or be jeopardized by emergencies during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-1049 - Engines and/or controllers can cause or be jeopardized by emergencies during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-1050 - Engines and/or controllers can cause or be jeopardized by emergencies during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-1051 - Engines and/or controllers can cause or be jeopardized by emergencies during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-1052 - Engines and/or controllers can cause or be jeopardized by emergencies during descent from separation to ocean impact. -- This hazard is not credible. (4 18 88)

LRB-P-M-1053 - Engines and/or controllers can cause or be jeopardized by emergencies during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 18 88)

LRB-P-M-1054 - Engines and/or controllers can cause or be jeopardized by emergencies during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 18 88)

LRB-P-M-1055 - Engines and/or controllers can cause or be jeopardized by emergencies during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

LRB-P-M-1056 - Engines and/or controllers can cause or be jeopardized by emergencies during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 18 88)

THESE HAZARDS WERE CONSIDERED BY THE ANALYST BUT
WERE NOT FURTHER ANALYZED FOR THE REASONS GIVEN

LRB-P-N-578 - TVC actuators and subsystem can cause or be jeopardized by unsafe or unhygienic working conditions during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-580 - TVC actuators and subsystem can cause or be jeopardized by unsafe or unhygienic working conditions during proof test of pressure vessels and structure. -- This hazard is not credible. (4 19 88)

LRB-P-N-581 - TVC actuators and subsystem can cause or be jeopardized by unsafe or unhygienic working conditions during acceptance test and checkout prior to delivery to the Government. -- The safety devices and procedures recommended in the analysis of N-579 appear to control this hazard. (4 19 88)

LRB-P-N-582 - TVC actuators and subsystem can cause or be jeopardized by unsafe or unhygienic working conditions during test firing of engines and/or the completed booster. -- This appears to be a FMEA item. (4 19 88)

LRB-P-N-583 - TVC actuators and subsystem can cause or be jeopardized by unsafe or unhygienic working conditions during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-584 - TVC actuators and subsystem can cause or be jeopardized by unsafe or unhygienic working conditions during preparation for shipment of the booster and ship loose hardware. -- The safety devices and procedures recommended in the analysis of N-579 appear to control this hazard. (4 19 88)

LRB-P-N-586 - TVC actuators and subsystem can cause or be jeopardized by unsafe or unhygienic working conditions during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-587 - TVC actuators and subsystem can cause or be jeopardized by unsafe or unhygienic working conditions during preflight checkout prior to stacking. -- The safety devices and procedures recommended in the analysis of N-579 appear to control this hazard. (4 19 88)

LRB-P-N-588 - TVC actuators and subsystem can cause or be jeopardized by unsafe or unhygienic working conditions during vehicle stacking, including ancillary test activities. -- The safety devices and procedures recommended in the analysis of N-579 appear to control this hazard. (4 19 88)

LRB-P-N-589 - TVC actuators and subsystem can cause or be jeopardized by unsafe or unhygienic working conditions during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-590 - TVC actuators and subsystem can cause or be jeopardized by unsafe or unhygienic working conditions during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-591 - TVC actuators and subsystem can cause or be jeopardized by unsafe or unhygienic working conditions during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-592 - TVC actuators and subsystem can cause or be jeopardized by unsafe or unhygienic working conditions during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-598 - TVC actuators and subsystem can cause or be jeopardized by unsafe or unhygienic working conditions during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 19 88)

LRB-P-N-599 - TVC actuators and subsystem can cause or be jeopardized by unsafe or unhygienic working conditions during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-600 - TVC actuators and subsystem can cause or be jeopardized by unsafe or unhygienic working conditions during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-650 - TVC actuators and subsystem can cause or be jeopardized by contamination during manufacture and fabrication of subsystems and components. -- This hazard appears to be adequately controlled by a contamination control plan. (4 19 88)

LRB-P-N-651 - TVC actuators and subsystem can cause or be jeopardized by contamination during inspection and test of the LRB and subsystems. -- This hazard appears to be adequately controlled by a contamination control plan. (4 19 88)

LRB-P-N-652 - TVC actuators and subsystem can cause or be jeopardized by contamination during proof test of pressure vessels and structure. -- This hazard appears to be adequately controlled by a contamination control plan. (4 19 88)

LRB-P-N-653 - TVC actuators and subsystem can cause or be jeopardized by

contamination during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (4 19 88)

LRB-P-N-654 - TVC actuators and subsystem can cause or be jeopardized by contamination during test firing of engines and/or the completed booster. -- This hazard appears to be adequately controlled by a contamination control plan. (4 19 88)

LRB-P-N-655 - TVC actuators and subsystem can cause or be jeopardized by contamination during flight readiness firing (FRF) of the STS vehicle. -- This hazard appears to be adequately controlled by a contamination control plan. (4 19 88)

LRB-P-N-656 - TVC actuators and subsystem can cause or be jeopardized by contamination during preparation for shipment of the booster and ship loose hardware. -- This hazard appears to be adequately controlled by a contamination control plan. (4 19 88)

LRB-P-N-657 - TVC actuators and subsystem can cause or be jeopardized by contamination during transportation from manufacture to launch site or after recovery. -- This hazard appears to be adequately controlled by a contamination control plan. (4 19 88)

LRB-P-N-658 - TVC actuators and subsystem can cause or be jeopardized by contamination during storage, including storage of major components. -- This hazard appears to be adequately controlled by a contamination control plan. (4 19 88)

LRB-P-N-659 - TVC actuators and subsystem can cause or be jeopardized by contamination during preflight checkout prior to stacking. -- This hazard appears to be adequately controlled by a contamination control plan. (4 19 88)

LRB-P-N-660 - TVC actuators and subsystem can cause or be jeopardized by contamination during vehicle stacking, including ancillary test activities. -- This hazard appears to be adequately controlled by a contamination control plan. (4 19 88)

LRB-P-N-661 - TVC actuators and subsystem can cause or be jeopardized by contamination during rollout from the VAB and preloading preparation. -- This hazard appears to be adequately controlled by a contamination control plan. (4 19 88)

LRB-P-N-662 - TVC actuators and subsystem can cause or be jeopardized by contamination during propellant loading for test or flight. -- Icing of the actuators during loading could restrict movement of the engines at engine start. However, since this hazard is currently adequately controlled on the SSMEs, it is reasonable to assume that it will be controlled on the LRB engines which would be chilled to a lesser degree by liquid oxygen. (4 19 88)

LRB-P-N-663 - TVC actuators and subsystem can cause or be jeopardized by contamination during countdown to liftoff or abort. -- See comments for N-662. (4 19 88)

LRB-P-N-664 - TVC actuators and subsystem can cause or be jeopardized by contamination during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-665 - TVC actuators and subsystem can cause or be jeopardized by contamination during nominal flight from liftoff to LRB burnout. -- This hazard is evaluated as N-946. (4 20 88)

LRB-P-N-666 - TVC actuators and subsystem can cause or be jeopardized by contamination during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-667 - TVC actuators and subsystem can cause or be jeopardized by contamination during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 19 88)

LRB-P-N-668 - TVC actuators and subsystem can cause or be jeopardized by contamination during descent from separation to ocean impact. -- This hazard is not credible. (4 19 88)

LRB-P-N-669 - TVC actuators and subsystem can cause or be jeopardized by contamination during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 19 88)

LRB-P-N-670 - TVC actuators and subsystem can cause or be jeopardized by contamination during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 19 88)

LRB-P-N-671 - TVC actuators and subsystem can cause or be jeopardized by contamination during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-672 - TVC actuators and subsystem can cause or be jeopardized by contamination during refurbishment of reusable components. -- This hazard appears to be adequately controlled by a contamination control plan. (4 19 88)

LRB-P-N-678 - TVC actuators and subsystem can cause or be jeopardized by heat sources during test firing of engines and/or the completed booster. -- This hazard is not credible. (4 19 88)

LRB-P-N-679 - TVC actuators and subsystem can cause or be jeopardized by heat

sources during flight readiness firing (FRF) of the STS vehicle. -- This hazard is not credible. (4 19 88)

LRB-P-N-681 - TVC actuators and subsystem can cause or be jeopardized by heat sources during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (4 19 88)

LRB-P-N-682 - TVC actuators and subsystem can cause or be jeopardized by heat sources during storage, including storage of major components. -- This hazard is not credible. (4 19 88)

LRB-P-N-685 - TVC actuators and subsystem can cause or be jeopardized by heat sources during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 19 88)

LRB-P-N-686 - TVC actuators and subsystem can cause or be jeopardized by heat sources during propellant loading for test or flight. -- This hazard is not credible. (4 19 88)

LRB-P-N-687 - TVC actuators and subsystem can cause or be jeopardized by heat sources during countdown to liftoff or abort. -- This hazard is not credible. (4 19 88)

LRB-P-N-688 - TVC actuators and subsystem can cause or be jeopardized by heat sources during launch abort activities, including mission postponement (scrub). -- This hazard is not credible. (4 19 88)

LRB-P-N-689 - TVC actuators and subsystem can cause or be jeopardized by heat sources during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (4 19 88)

LRB-P-N-690 - TVC actuators and subsystem can cause or be jeopardized by heat sources during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (4 19 88)

LRB-P-N-691 - TVC actuators and subsystem can cause or be jeopardized by heat sources during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 19 88)

LRB-P-N-692 - TVC actuators and subsystem can cause or be jeopardized by heat sources during descent from separation to ocean impact. -- This hazard is not credible. (4 19 88)

LRB-P-N-699 - TVC actuators and subsystem can cause or be jeopardized by radiation or sunlight during inspection and test of the LRB and subsystems. -- This hazard is not credible. (4 19 88)

LRB-P-N-701 - TVC actuators and subsystem can cause or be jeopardized by radiation or sunlight during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (4 19 88)

LRB-P-N-702 - TVC actuators and subsystem can cause or be jeopardized by radiation or sunlight during test firing of engines and/or the completed booster. -- This hazard is not credible. (4 19 88)

LRB-P-N-703 - TVC actuators and subsystem can cause or be jeopardized by radiation or sunlight during flight readiness firing (FRF) of the STS vehicle. -- This hazard is not credible. (4 19 88)

LRB-P-N-705 - TVC actuators and subsystem can cause or be jeopardized by radiation or sunlight during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (4 19 88)

LRB-P-N-708 - TVC actuators and subsystem can cause or be jeopardized by radiation or sunlight during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (4 19 88)

LRB-P-N-709 - TVC actuators and subsystem can cause or be jeopardized by radiation or sunlight during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 19 88)

LRB-P-N-710 - TVC actuators and subsystem can cause or be jeopardized by radiation or sunlight during propellant loading for test or flight. -- This hazard is not credible. (4 19 88)

LRB-P-N-711 - TVC actuators and subsystem can cause or be jeopardized by radiation or sunlight during countdown to liftoff or abort. -- This hazard is not credible. (4 19 88)

LRB-P-N-712 - TVC actuators and subsystem can cause or be jeopardized by radiation or sunlight during launch abort activities, including mission postponement (scrub). -- This hazard is not credible. (4 19 88)

LRB-P-N-713 - TVC actuators and subsystem can cause or be jeopardized by radiation or sunlight during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (4 19 88)

LRB-P-N-714 - TVC actuators and subsystem can cause or be jeopardized by radiation or sunlight during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (4 19 88)

LRB-P-N-715 - TVC actuators and subsystem can cause or be jeopardized by radiation or sunlight during separation of the LRB from the STS vehicle. -- This

hazard is not credible. (4 19 88)

LRB-P-N-716 - TVC actuators and subsystem can cause or be jeopardized by radiation or sunlight during descent from separation to ocean impact. -- This hazard is not credible. (4 19 88)

LRB-P-N-717 - TVC actuators and subsystem can cause or be jeopardized by radiation or sunlight during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 19 88)

LRB-P-N-718 - TVC actuators and subsystem can cause or be jeopardized by radiation or sunlight during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 19 88)

LRB-P-N-719 - TVC actuators and subsystem can cause or be jeopardized by radiation or sunlight during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (4 19 88)

LRB-P-N-720 - TVC actuators and subsystem can cause or be jeopardized by radiation or sunlight during refurbishment of reusable components. -- This hazard is not credible. (4 19 88)

LRB-P-N-724 - TVC actuators and subsystem can cause or be jeopardized by moisture or precipitation during proof test of pressure vessels and structure. -- This hazard is not credible. (4 19 88)

LRB-P-N-726 - TVC actuators and subsystem can cause or be jeopardized by moisture or precipitation during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-727 - TVC actuators and subsystem can cause or be jeopardized by moisture or precipitation during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-729 - TVC actuators and subsystem can cause or be jeopardized by moisture or precipitation during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-730 - TVC actuators and subsystem can cause or be jeopardized by moisture or precipitation during storage, including storage of major components. -- This hazard is not credible. (4 19 88)

LRB-P-N-731 - TVC actuators and subsystem can cause or be jeopardized by moisture or precipitation during preflight checkout prior to stacking. -- This hazard is not credible. (4 19 88)

LRB-P-N-732 - TVC actuators and subsystem can cause or be jeopardized by moisture or precipitation during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (4 19 88)

LRB-P-N-733 - TVC actuators and subsystem can cause or be jeopardized by moisture or precipitation during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-734 - TVC actuators and subsystem can cause or be jeopardized by moisture or precipitation during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-735 - TVC actuators and subsystem can cause or be jeopardized by moisture or precipitation during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-736 - TVC actuators and subsystem can cause or be jeopardized by moisture or precipitation during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-737 - TVC actuators and subsystem can cause or be jeopardized by moisture or precipitation during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (4 19 88)

LRB-P-N-738 - TVC actuators and subsystem can cause or be jeopardized by moisture or precipitation during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (4 19 88)

LRB-P-N-739 - TVC actuators and subsystem can cause or be jeopardized by moisture or precipitation during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 19 88)

LRB-P-N-740 - TVC actuators and subsystem can cause or be jeopardized by moisture or precipitation during descent from separation to ocean impact. -- This hazard is not credible. (4 19 88)

LRB-P-N-741 - TVC actuators and subsystem can cause or be jeopardized by moisture or precipitation during splashdown events occuring at impact (disposable for expendables). -- It is assumed that recoverable components will not be damaged by immersion in seawater. (4 19 88)

LRB-P-N-742 - TVC actuators and subsystem can cause or be jeopardized by moisture or precipitation during floatation (of recoverable boosters) until recovery. -- See comments for N-742. (4 19 88)

LRB-P-N-743 - TVC actuators and subsystem can cause or be jeopardized by moisture or precipitation during recovery activities, including towing, and retrieval of recoverables. -- See comments for N-741. (4 19 88)

LRB-P-N-744 - TVC actuators and subsystem can cause or be jeopardized by moisture or precipitation during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-746 - TVC actuators and subsystem can cause or be jeopardized by electrical system malfunction during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-747 - TVC actuators and subsystem can cause or be jeopardized by electrical system malfunction during inspection and test of the LRB and subsystems. -- This hazard is analyzed as E-747. (4 19 88)

LRB-P-N-748 - TVC actuators and subsystem can cause or be jeopardized by electrical system malfunction during proof test of pressure vessels and structure. -- This hazard is analyzed as G-748. (4 19 88)

LRB-P-N-749 - TVC actuators and subsystem can cause or be jeopardized by electrical system malfunction during acceptance test and checkout prior to delivery to the Government. -- This hazard appears to be covered by E-747. (4 19 88)

LRB-P-N-750 - TVC actuators and subsystem can cause or be jeopardized by electrical system malfunction during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-751 - TVC actuators and subsystem can cause or be jeopardized by electrical system malfunction during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-752 - TVC actuators and subsystem can cause or be jeopardized by electrical system malfunction during preparation for shipment of the booster and ship loose hardware. -- This hazard is not credible. (4 19 88)

LRB-P-N-753 - TVC actuators and subsystem can cause or be jeopardized by electrical system malfunction during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (4 19 88)

LRB-P-N-754 - TVC actuators and subsystem can cause or be jeopardized by electrical system malfunction during storage, including storage of major components. -- This hazard is not credible. (4 19 88)

LRB-P-N-755 - TVC actuators and subsystem can cause or be jeopardized by

electrical system malfunction during preflight checkout prior to stacking. -- This hazard is not credible. (4 19 88)

LRB-P-N-756 - TVC actuators and subsystem can cause or be jeopardized by electrical system malfunction during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (4 19 88)

LRB-P-N-757 - TVC actuators and subsystem can cause or be jeopardized by electrical system malfunction during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-758 - TVC actuators and subsystem can cause or be jeopardized by electrical system malfunction during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-759 - TVC actuators and subsystem can cause or be jeopardized by electrical system malfunction during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-760 - TVC actuators and subsystem can cause or be jeopardized by electrical system malfunction during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-761 - TVC actuators and subsystem can cause or be jeopardized by electrical system malfunction during nominal flight from liftoff to LRB burnout. -- Since electrical signals will be used to gimbal the engines, electrical malfunction is an obvious hazard. However, this appears to be a FMEA item which is not amenable to analysis at this time. (4 19 88)

LRB-P-N-762 - TVC actuators and subsystem can cause or be jeopardized by electrical system malfunction during intact abort, including RTLS, TAL, AOA and ATO. -- This appears to be a FMEA item. (4 19 88)

LRB-P-N-763 - TVC actuators and subsystem can cause or be jeopardized by electrical system malfunction during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-764 - TVC actuators and subsystem can cause or be jeopardized by electrical system malfunction during descent from separation to ocean impact. -- This hazard is not credible. (4 19 88)

LRB-P-N-765 - TVC actuators and subsystem can cause or be jeopardized by electrical system malfunction during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 19 88)

LRB-P-N-766 - TVC actuators and subsystem can cause or be jeopardized by electrical system malfunction during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 19 88)

LRB-P-N-767 - TVC actuators and subsystem can cause or be jeopardized by electrical system malfunction during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (4 19 88)

LRB-P-N-768 - TVC actuators and subsystem can cause or be jeopardized by electrical system malfunction during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-772 - TVC actuators and subsystem can cause or be jeopardized by differential pressure during proof test of pressure vessels and structure. -- Since TVC assemblies will be designed to withstand any proof test to which they might be subjected, this hazard does not appear credible. (4 19 88)

LRB-P-N-775 - TVC actuators and subsystem can cause or be jeopardized by differential pressure during flight readiness firing (FRF) of the STS vehicle. -- To the extent to which it applies, this hazard is analyzed as N-774. (4 19 88)

LRB-P-N-777 - TVC actuators and subsystem can cause or be jeopardized by differential pressure during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (4 19 88)

LRB-P-N-778 - TVC actuators and subsystem can cause or be jeopardized by differential pressure during storage, including storage of major components. -- This hazard is not credible. (4 19 88)

LRB-P-N-782 - TVC actuators and subsystem can cause or be jeopardized by differential pressure during propellant loading for test or flight. -- This hazard is not credible. (4 19 88)

LRB-P-N-783 - TVC actuators and subsystem can cause or be jeopardized by differential pressure during countdown to liftoff or abort. -- This hazard is not credible. (4 19 88)

LRB-P-N-784 - TVC actuators and subsystem can cause or be jeopardized by differential pressure during launch abort activities, including mission postponement (scrub). -- This hazard is not credible. (4 19 88)

LRB-P-N-785 - TVC actuators and subsystem can cause or be jeopardized by differential pressure during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (4 19 88)

LRB-P-N-786 - TVC actuators and subsystem can cause or be jeopardized by

differential pressure during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (4 19 88)

LRB-P-N-787 - TVC actuators and subsystem can cause or be jeopardized by differential pressure during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 19 88)

LRB-P-N-788 - TVC actuators and subsystem can cause or be jeopardized by differential pressure during descent from separation to ocean impact. -- This hazard is not credible. (4 19 88)

LRB-P-N-789 - TVC actuators and subsystem can cause or be jeopardized by differential pressure during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 19 88)

LRB-P-N-790 - TVC actuators and subsystem can cause or be jeopardized by differential pressure during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 19 88)

LRB-P-N-791 - TVC actuators and subsystem can cause or be jeopardized by differential pressure during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (4 19 88)

LRB-P-N-798 - TVC actuators and subsystem can cause or be jeopardized by vibration, acoustic loads or shock during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-799 - TVC actuators and subsystem can cause or be jeopardized by vibration, acoustic loads or shock during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-801 - TVC actuators and subsystem can cause or be jeopardized by vibration, acoustic loads or shock during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (4 19 88)

LRB-P-N-808 - TVC actuators and subsystem can cause or be jeopardized by vibration, acoustic loads or shock during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-809 - TVC actuators and subsystem can cause or be jeopardized by vibration, acoustic loads or shock during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (4 19 88)

LRB-P-N-810 - TVC actuators and subsystem can cause or be jeopardized by vibration, acoustic loads or shock during intact abort, including RTLS, TAL, AOA and

ATO. -- This hazard is not credible. (4 19 88)

LRB-P-N-811 - TVC actuators and subsystem can cause or be jeopardized by vibration, acoustic loads or shock during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 19 88)

LRB-P-N-812 - TVC actuators and subsystem can cause or be jeopardized by vibration, acoustic loads or shock during descent from separation to ocean impact. -- This hazard is not credible. (4 19 88)

LRB-P-N-813 - TVC actuators and subsystem can cause or be jeopardized by vibration, acoustic loads or shock during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 19 88)

LRB-P-N-815 - TVC actuators and subsystem can cause or be jeopardized by vibration, acoustic loads or shock during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (4 19 88)

LRB-P-N-820 - TVC actuators and subsystem can cause or be jeopardized by structural loads during proof test of pressure vessels and structure. -- Since systems will be designed to survive proof loads, this does not appear to be a credible hazard. (4 19 88)

LRB-P-N-822 - TVC actuators and subsystem can cause or be jeopardized by structural loads during test firing of engines and/or the completed booster. -- This hazard is not credible. (4 19 88)

LRB-P-N-823 - TVC actuators and subsystem can cause or be jeopardized by structural loads during flight readiness firing (FRF) of the STS vehicle. -- This hazard is not credible. (4 19 88)

LRB-P-N-825 - TVC actuators and subsystem can cause or be jeopardized by structural loads during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (4 19 88)

LRB-P-N-828 - TVC actuators and subsystem can cause or be jeopardized by structural loads during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (4 19 88)

LRB-P-N-829 - TVC actuators and subsystem can cause or be jeopardized by structural loads during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 19 88)

LRB-P-N-830 - TVC actuators and subsystem can cause or be jeopardized by structural loads during propellant loading for test or flight. -- This hazard is not credible. (4 19 88)

LRB-P-N-831 - TVC actuators and subsystem can cause or be jeopardized by structural loads during countdown to liftoff or abort. -- This hazard is not credible. (4 19 88)

LRB-P-N-832 - TVC actuators and subsystem can cause or be jeopardized by structural loads during launch abort activities, including mission postponement (scrub). -- This hazard is not credible. (4 19 88)

LRB-P-N-833 - TVC actuators and subsystem can cause or be jeopardized by structural loads during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (4 19 88)

LRB-P-N-834 - TVC actuators and subsystem can cause or be jeopardized by structural loads during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (4 19 88)

LRB-P-N-835 - TVC actuators and subsystem can cause or be jeopardized by structural loads during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 19 88)

LRB-P-N-836 - TVC actuators and subsystem can cause or be jeopardized by structural loads during descent from separation to ocean impact. -- This hazard is not credible. (4 19 88)

LRB-P-N-837 - TVC actuators and subsystem can cause or be jeopardized by structural loads during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 19 88)

LRB-P-N-838 - TVC actuators and subsystem can cause or be jeopardized by structural loads during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 19 88)

LRB-P-N-839 - TVC actuators and subsystem can cause or be jeopardized by structural loads during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (4 19 88)

LRB-P-N-844 - TVC actuators and subsystem can cause or be jeopardized by leaks during proof test of pressure vessels and structure. -- This hazard appears to be essentially the same as that analyzed as N-843. (4 19 88)

LRB-P-N-845 - TVC actuators and subsystem can cause or be jeopardized by leaks during acceptance test and checkout prior to delivery to the Government. -- Leakage during acceptance testing is not likely to be hazardous. (4 19 88)

LRB-P-N-846 - TVC actuators and subsystem can cause or be jeopardized by leaks during test firing of engines and/or the completed booster. -- This hazard, and those

due to leakage affecting the TVC system during FRF, countdown and flight, appear to be FMEA items not amenable to analysis at this time. (4 19 88)

LRB-P-N-847 - TVC actuators and subsystem can cause or be jeopardized by leaks during flight readiness firing (FRF) of the STS vehicle. -- See comments for N-846. (4 19 88)

LRB-P-N-849 - TVC actuators and subsystem can cause or be jeopardized by leaks during transportation from manufacture to launch site or after recovery. -- Leakage during this time may be a nuisance, but it is not likely to be hazardous except for the possibility of causing personnel to slip and fall, which is a hazard associated with industrial housekeeping. (4 19 88)

LRB-P-N-850 - TVC actuators and subsystem can cause or be jeopardized by leaks during storage, including storage of major components. -- This hazard is not credible. (4 19 88)

LRB-P-N-851 - TVC actuators and subsystem can cause or be jeopardized by leaks during preflight checkout prior to stacking. -- See comment for N-846. (4 19 88)

LRB-P-N-852 - TVC actuators and subsystem can cause or be jeopardized by leaks during vehicle stacking, including ancillary test activities. -- This hazard is analyzed as N-843. (4 19 88)

LRB-P-N-853 - TVC actuators and subsystem can cause or be jeopardized by leaks during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-854 - TVC actuators and subsystem can cause or be jeopardized by leaks during propellant loading for test or flight. -- See comment for N-846. (4 19 88)

LRB-P-N-855 - TVC actuators and subsystem can cause or be jeopardized by leaks during countdown to liftoff or abort. -- See comment for N-846. (4 19 88)

LRB-P-N-856 - TVC actuators and subsystem can cause or be jeopardized by leaks during launch abort activities, including mission postponement (scrub). -- See comment for N-846. (4 19 88)

LRB-P-N-857 - TVC actuators and subsystem can cause or be jeopardized by leaks during nominal flight from liftoff to LRB burnout. -- See comment for N-846. (4 19 88)

LRB-P-N-858 - TVC actuators and subsystem can cause or be jeopardized by leaks during intact abort, including RTLS, TAL, AOA and ATO. -- See comment for N-846. (4 19 88)

LRB-P-N-859 - TVC actuators and subsystem can cause or be jeopardized by leaks

during separation of the LRB from the STS vehicle. -- See comment for N-846. (4 19 88)

LRB-P-N-860 - TVC actuators and subsystem can cause or be jeopardized by leaks during descent from separation to ocean impact. -- This hazard is not credible. (4 19 88)

LRB-P-N-861 - TVC actuators and subsystem can cause or be jeopardized by leaks during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 19 88)

LRB-P-N-862 - TVC actuators and subsystem can cause or be jeopardized by leaks during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 19 88)

LRB-P-N-863 - TVC actuators and subsystem can cause or be jeopardized by leaks during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (4 19 88)

LRB-P-N-864 - TVC actuators and subsystem can cause or be jeopardized by leaks during refurbishment of reusable components. -- This hazard is not credible. (4 19 88)

LRB-P-N-894 - TVC actuators and subsystem can cause or be jeopardized by lightning or electromagnetic discharge during test firing of engines and/or the completed booster. -- Hazards associated with the TVC due to lightning appear to be those analyzed as electrical hazards. This comment applies to all of the following hazards concerning lightning. (4 19 88)

LRB-P-N-895 - TVC actuators and subsystem can cause or be jeopardized by lightning or electromagnetic discharge during flight readiness firing (FRF) of the STS vehicle. -- Hazards associated with the TVC due to lightning appear to be those analyzed as electrical hazards. This comment applies to all of the following hazards concerning lightning. (4 19 88)

LRB-P-N-897 - TVC actuators and subsystem can cause or be jeopardized by lightning or electromagnetic discharge during transportation from manufacture to launch site or after recovery. -- Hazards associated with the TVC due to lightning appear to be those analyzed as electrical hazards. This comment applies to all of the following hazards concerning lightning. (4 19 88)

LRB-P-N-898 - TVC actuators and subsystem can cause or be jeopardized by lightning or electromagnetic discharge during storage, including storage of major components. -- This hazard is not credible. (4 19 88)

LRB-P-N-901 - TVC actuators and subsystem can cause or be jeopardized by

lightning or electromagnetic discharge during rollout from the VAB and preloading preparation. -- Hazards associated with the TVC due to lightning appear to be those analyzed as electrical hazards. This comment applies to all of the following hazards concerning lightning. (4 19 88)

LRB-P-N-902 - TVC actuators and subsystem can cause or be jeopardized by lightning or electromagnetic discharge during propellant loading for test or flight. -- Hazards associated with the TVC due to lightning appear to be those analyzed as electrical hazards. This comment applies to all of the following hazards concerning lightning. (4 19 88)

LRB-P-N-903 - TVC actuators and subsystem can cause or be jeopardized by lightning or electromagnetic discharge during countdown to liftoff or abort. -- Hazards associated with the TVC due to lightning appear to be those analyzed as electrical hazards. This comment applies to all of the following hazards concerning lightning. (4 19 88)

LRB-P-N-904 - TVC actuators and subsystem can cause or be jeopardized by lightning or electromagnetic discharge during launch abort activities, including mission postponement (scrub). -- Hazards associated with the TVC due to lightning appear to be those analyzed as electrical hazards. This comment applies to all of the following hazards concerning lightning. (4 19 88)

LRB-P-N-905 - TVC actuators and subsystem can cause or be jeopardized by lightning or electromagnetic discharge during nominal flight from liftoff to LRB burnout. -- Hazards associated with the TVC due to lightning appear to be those analyzed as electrical hazards. This comment applies to all of the following hazards concerning lightning. (4 19 88)

LRB-P-N-906 - TVC actuators and subsystem can cause or be jeopardized by lightning or electromagnetic discharge during intact abort, including RTLS, TAL, AOA and ATO. -- Hazards associated with the TVC due to lightning appear to be those analyzed as electrical hazards. This comment applies to all of the following hazards concerning lightning. (4 19 88)

LRB-P-N-907 - TVC actuators and subsystem can cause or be jeopardized by lightning or electromagnetic discharge during separation of the LRB from the STS vehicle. -- Hazards associated with the TVC due to lightning appear to be those analyzed as electrical hazards. This comment applies to all of the following hazards concerning lightning. (4 19 88)

LRB-P-N-908 - TVC actuators and subsystem can cause or be jeopardized by lightning or electromagnetic discharge during descent from separation to ocean impact. -- Hazards associated with the TVC due to lightning appear to be those analyzed as electrical hazards. This comment applies to all of the following hazards concerning lightning. (4 19 88)

LRB-P-N-909 - TVC actuators and subsystem can cause or be jeopardized by lightning or electromagnetic discharge during splashdown events occuring at impact (disposable for expendables). -- Hazards associated with the TVC due to lightning appear to be those analyzed as electrical hazards. This comment applies to all of the following hazards concerning lightning. (4 19 88)

LRB-P-N-910 - TVC actuators and subsystem can cause or be jeopardized by lightning or electromagnetic discharge during floatation (of recoverable boosters) until recovery. -- Hazards associated with the TVC due to lightning appear to be those analyzed as electrical hazards. This comment applies to all of the following hazards concerning lightning. (4 19 88)

LRB-P-N-911 - TVC actuators and subsystem can cause or be jeopardized by lightning or electromagnetic discharge during recovery activities, including towing, and retrieval of recoverables. -- Hazards associated with the TVC due to lightning appear to be those analyzed as electrical hazards. This comment applies to all of the following hazards concerning lightning. (4 19 88)

LRB-P-N-913 - TVC actuators and subsystem can cause or be jeopardized by faulty documentation during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (4 19 88)

LRB-P-N-914 - TVC actuators and subsystem can cause or be jeopardized by faulty documentation during manufacture and fabrication of subsystems and components. -- This hazard is analyzed as M-914. (4 19 88)

LRB-P-N-915 - TVC actuators and subsystem can cause or be jeopardized by faulty documentation during inspection and test of the LRB and subsystems. -- Test documentation must contain provisions for protecting personnel from pinch points by locking the TVC when personnel are working on the system. This hazard is analyzed as N-579. (4 19 88)

LRB-P-N-916 - TVC actuators and subsystem can cause or be jeopardized by faulty documentation during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-917 - TVC actuators and subsystem can cause or be jeopardized by faulty documentation during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-918 - TVC actuators and subsystem can cause or be jeopardized by faulty documentation during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-919 - TVC actuators and subsystem can cause or be jeopardized by faulty

documentation during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-920 - TVC actuators and subsystem can cause or be jeopardized by faulty documentation during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-921 - TVC actuators and subsystem can cause or be jeopardized by faulty documentation during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-922 - TVC actuators and subsystem can cause or be jeopardized by faulty documentation during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-923 - TVC actuators and subsystem can cause or be jeopardized by faulty documentation during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-924 - TVC actuators and subsystem can cause or be jeopardized by faulty documentation during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-925 - TVC actuators and subsystem can cause or be jeopardized by faulty documentation during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-926 - TVC actuators and subsystem can cause or be jeopardized by faulty documentation during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-927 - TVC actuators and subsystem can cause or be jeopardized by faulty documentation during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-928 - TVC actuators and subsystem can cause or be jeopardized by faulty documentation during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-929 - TVC actuators and subsystem can cause or be jeopardized by faulty documentation during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-930 - TVC actuators and subsystem can cause or be jeopardized by faulty

documentation during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-931 - TVC actuators and subsystem can cause or be jeopardized by faulty documentation during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 19 88)

LRB-P-N-935 - TVC actuators and subsystem can cause or be jeopardized by faulty documentation during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (4 19 88)

LRB-P-N-936 - TVC actuators and subsystem can cause or be jeopardized by faulty documentation during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-938 - TVC actuators and subsystem can cause or be jeopardized by chemical activity during manufacture and fabrication of subsystems and components. -- This hazard is not credible. (4 19 88)

LRB-P-N-939 - TVC actuators and subsystem can cause or be jeopardized by chemical activity during inspection and test of the LRB and subsystems. -- This hazard is not credible. (4 19 88)

LRB-P-N-940 - TVC actuators and subsystem can cause or be jeopardized by chemical activity during proof test of pressure vessels and structure. -- This hazard is not credible. (4 19 88)

LRB-P-N-941 - TVC actuators and subsystem can cause or be jeopardized by chemical activity during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (4 19 88)

LRB-P-N-942 - TVC actuators and subsystem can cause or be jeopardized by chemical activity during test firing of engines and/or the completed booster. -- This hazard is analyzed as N-946. (4 19 88)

LRB-P-N-943 - TVC actuators and subsystem can cause or be jeopardized by chemical activity during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as N-946. (4 19 88)

LRB-P-N-944 - TVC actuators and subsystem can cause or be jeopardized by chemical activity during preparation for shipment of the booster and ship loose hardware. -- This hazard is not credible. (4 19 88)

LRB-P-N-945 - TVC actuators and subsystem can cause or be jeopardized by chemical activity during transportation from manufacture to launch site or after recovery. -- This hazard is analyzed as N-946. (4 19 88)

LRB-P-N-947 - TVC actuators and subsystem can cause or be jeopardized by chemical activity during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-948 - TVC actuators and subsystem can cause or be jeopardized by chemical activity during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (4 19 88)

LRB-P-N-949 - TVC actuators and subsystem can cause or be jeopardized by chemical activity during rollout from the VAB and preloading preparation. -- This hazard is analyzed as N-946. (4 19 88)

LRB-P-N-950 - TVC actuators and subsystem can cause or be jeopardized by chemical activity during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-951 - TVC actuators and subsystem can cause or be jeopardized by chemical activity during countdown to liftoff or abort. -- This hazard is not credible. (4 19 88)

LRB-P-N-952 - TVC actuators and subsystem can cause or be jeopardized by chemical activity during launch abort activities, including mission postponement (scrub). -- This hazard is not credible. (4 19 88)

LRB-P-N-953 - TVC actuators and subsystem can cause or be jeopardized by chemical activity during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (4 19 88)

LRB-P-N-954 - TVC actuators and subsystem can cause or be jeopardized by chemical activity during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (4 19 88)

LRB-P-N-955 - TVC actuators and subsystem can cause or be jeopardized by chemical activity during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 19 88)

LRB-P-N-956 - TVC actuators and subsystem can cause or be jeopardized by chemical activity during descent from separation to ocean impact. -- This hazard is not credible. (4 19 88)

LRB-P-N-957 - TVC actuators and subsystem can cause or be jeopardized by chemical activity during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 19 88)

LRB-P-N-958 - TVC actuators and subsystem can cause or be jeopardized by chemical activity during floatation (of recoverable boosters) until recovery. -- This

hazard is analyzed as N-946. (4 19 88)

LRB-P-N-959 - TVC actuators and subsystem can cause or be jeopardized by chemical activity during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (4 19 88)

LRB-P-N-960 - TVC actuators and subsystem can cause or be jeopardized by chemical activity during refurbishment of reusable components. -- This hazard is not credible. (4 19 88)

LRB-P-N-962 - TVC actuators and subsystem can cause or be jeopardized by computer system malfunction during manufacture and fabrication of subsystems and components. -- This hazard appears to be related to malfunction of computer operated manufacturing tooling, which would be analyzed as a tooling hazard. It is certain that any damage due to this cause would be detected during subsequent inspection. (4 19 88)

LRB-P-N-963 - TVC actuators and subsystem can cause or be jeopardized by computer system malfunction during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-964 - TVC actuators and subsystem can cause or be jeopardized by computer system malfunction during proof test of pressure vessels and structure. -- This hazard is analyzed as G-748. (4 19 88)

LRB-P-N-965 - TVC actuators and subsystem can cause or be jeopardized by computer system malfunction during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (4 19 88)

LRB-P-N-966 - TVC actuators and subsystem can cause or be jeopardized by computer system malfunction during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-967 - TVC actuators and subsystem can cause or be jeopardized by computer system malfunction during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-969 - TVC actuators and subsystem can cause or be jeopardized by computer system malfunction during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (4 19 88)

LRB-P-N-970 - TVC actuators and subsystem can cause or be jeopardized by computer system malfunction during storage, including storage of major components. -- This hazard is not credible. (4 19 88)

LRB-P-N-971 - TVC actuators and subsystem can cause or be jeopardized by

computer system malfunction during preflight checkout prior to stacking. -- This hazard is not credible. (4 19 88)

LRB-P-N-972 - TVC actuators and subsystem can cause or be jeopardized by computer system malfunction during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (4 19 88)

LRB-P-N-973 - TVC actuators and subsystem can cause or be jeopardized by computer system malfunction during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 19 88)

LRB-P-N-974 - TVC actuators and subsystem can cause or be jeopardized by computer system malfunction during propellant loading for test or flight. -- This hazard is not credible. (4 19 88)

LRB-P-N-975 - TVC actuators and subsystem can cause or be jeopardized by computer system malfunction during countdown to liftoff or abort. -- This hazard is not credible. (4 19 88)

LRB-P-N-976 - TVC actuators and subsystem can cause or be jeopardized by computer system malfunction during launch abort activities, including mission postponement (scrub). -- This hazard is not credible. (4 19 88)

LRB-P-N-977 - TVC actuators and subsystem can cause or be jeopardized by computer system malfunction during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (4 19 88)

LRB-P-N-978 - TVC actuators and subsystem can cause or be jeopardized by computer system malfunction during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (4 19 88)

LRB-P-N-979 - TVC actuators and subsystem can cause or be jeopardized by computer system malfunction during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 19 88)

LRB-P-N-980 - TVC actuators and subsystem can cause or be jeopardized by computer system malfunction during descent from separation to ocean impact. -- This hazard is not credible. (4 19 88)

LRB-P-N-981 - TVC actuators and subsystem can cause or be jeopardized by computer system malfunction during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 19 88)

LRB-P-N-982 - TVC actuators and subsystem can cause or be jeopardized by computer system malfunction during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 19 88)

LRB-P-N-983 - TVC actuators and subsystem can cause or be jeopardized by computer system malfunction during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (4 19 88)

LRB-P-N-984 - TVC actuators and subsystem can cause or be jeopardized by computer system malfunction during refurbishment of reusable components. -- This hazard is not credible. (4 19 88)

LRB-P-N-1011 - TVC actuators and subsystem can cause or be jeopardized by wear during inspection and test of the LRB and subsystems. -- This hazard is not credible. (4 19 88)

LRB-P-N-1012 - TVC actuators and subsystem can cause or be jeopardized by wear during proof test of pressure vessels and structure. -- This hazard is not credible. (4 19 88)

LRB-P-N-1013 - TVC actuators and subsystem can cause or be jeopardized by wear during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (4 19 88)

LRB-P-N-1015 - TVC actuators and subsystem can cause or be jeopardized by wear during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as N-1014. (4 19 88)

LRB-P-N-1017 - TVC actuators and subsystem can cause or be jeopardized by wear during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (4 19 88)

LRB-P-N-1020 - TVC actuators and subsystem can cause or be jeopardized by wear during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (4 19 88)

LRB-P-N-1021 - TVC actuators and subsystem can cause or be jeopardized by wear during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 19 88)

LRB-P-N-1022 - TVC actuators and subsystem can cause or be jeopardized by wear during propellant loading for test or flight. -- This hazard is not credible. (4 19 88)

LRB-P-N-1023 - TVC actuators and subsystem can cause or be jeopardized by wear during countdown to liftoff or abort. -- This hazard is not credible. (4 19 88)

LRB-P-N-1024 - TVC actuators and subsystem can cause or be jeopardized by wear during launch abort activities, including mission postponement (scrub). -- This hazard is not credible. (4 19 88)

LRB-P-N-1025 - TVC actuators and subsystem can cause or be jeopardized by wear during nominal flight from liftoff to LRB burnout. -- This hazard is associated with that analyzed as N-1014. (4 19 88)

LRB-P-N-1026 - TVC actuators and subsystem can cause or be jeopardized by wear during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (4 19 88)

LRB-P-N-1027 - TVC actuators and subsystem can cause or be jeopardized by wear during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 19 88)

LRB-P-N-1028 - TVC actuators and subsystem can cause or be jeopardized by wear during descent from separation to ocean impact. -- This hazard is not credible. (4 19 88)

LRB-P-N-1029 - TVC actuators and subsystem can cause or be jeopardized by wear during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 19 88)

LRB-P-N-1031 - TVC actuators and subsystem can cause or be jeopardized by wear during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (4 19 88)

LRB-P-N-1032 - TVC actuators and subsystem can cause or be jeopardized by wear during refurbishment of reusable components. -- This hazard is associated with that analyzed as N-1014. (4 19 88)

LRB-P-N-1034 - TVC actuators and subsystem can cause or be jeopardized by emergencies during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-1035 - TVC actuators and subsystem can cause or be jeopardized by emergencies during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-1036 - TVC actuators and subsystem can cause or be jeopardized by emergencies during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-1037 - TVC actuators and subsystem can cause or be jeopardized by emergencies during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-1038 - TVC actuators and subsystem can cause or be jeopardized by

emergencies during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-1039 - TVC actuators and subsystem can cause or be jeopardized by emergencies during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-1040 - TVC actuators and subsystem can cause or be jeopardized by emergencies during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-1041 - TVC actuators and subsystem can cause or be jeopardized by emergencies during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-1042 - TVC actuators and subsystem can cause or be jeopardized by emergencies during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-1043 - TVC actuators and subsystem can cause or be jeopardized by emergencies during preflight checkout prior to stacking. -- This hazard is not credible. (4 19 88)

LRB-P-N-1044 - TVC actuators and subsystem can cause or be jeopardized by emergencies during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (4 19 88)

LRB-P-N-1045 - TVC actuators and subsystem can cause or be jeopardized by emergencies during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 19 88)

LRB-P-N-1046 - TVC actuators and subsystem can cause or be jeopardized by emergencies during propellant loading for test or flight. -- This hazard is not credible. (4 19 88)

LRB-P-N-1047 - TVC actuators and subsystem can cause or be jeopardized by emergencies during countdown to liftoff or abort. -- This hazard is not credible. (4 19 88)

LRB-P-N-1048 - TVC actuators and subsystem can cause or be jeopardized by emergencies during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-1049 - TVC actuators and subsystem can cause or be jeopardized by emergencies during nominal flight from liftoff to LRB burnout. -- At the current state of

maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-1050 - TVC actuators and subsystem can cause or be jeopardized by emergencies during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 19 88)

LRB-P-N-1051 - TVC actuators and subsystem can cause or be jeopardized by emergencies during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 19 88)

LRB-P-N-1052 - TVC actuators and subsystem can cause or be jeopardized by emergencies during descent from separation to ocean impact. -- This hazard is not credible. (4 19 88)

LRB-P-N-1053 - TVC actuators and subsystem can cause or be jeopardized by emergencies during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 19 88)

LRB-P-N-1054 - TVC actuators and subsystem can cause or be jeopardized by emergencies during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 19 88)

LRB-P-N-1055 - TVC actuators and subsystem can cause or be jeopardized by emergencies during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (4 19 88)

LRB-P-N-1056 - TVC actuators and subsystem can cause or be jeopardized by emergencies during refurbishment of reusable components. -- This hazard is not credible. (4 19 88)

THESE HAZARDS WERE CONSIDERED BY THE ANALYST BUT WERE NOT FURTHER ANALYZED FOR THE REASONS GIVEN

LRB-P-O-655 - The Orbiter, subsystems and payload can cause or be jeopardized by contamination during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-660 - The Orbiter, subsystems and payload can cause or be jeopardized by contamination during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-661 - The Orbiter, subsystems and payload can cause or be jeopardized by contamination during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-662 - The Orbiter, subsystems and payload can cause or be jeopardized by contamination during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-663 - The Orbiter, subsystems and payload can cause or be jeopardized by contamination during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-664 - The Orbiter, subsystems and payload can cause or be jeopardized by contamination during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-665 - The Orbiter, subsystems and payload can cause or be jeopardized by contamination during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-666 - The Orbiter, subsystems and payload can cause or be jeopardized by contamination during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-667 - The Orbiter, subsystems and payload can cause or be jeopardized by contamination during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-685 - The Orbiter, subsystems and payload can cause or be jeopardized by heat sources during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 20 88)

LRB-P-O-686 - The Orbiter, subsystems and payload can cause or be jeopardized by heat sources during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-687 - The Orbiter, subsystems and payload can cause or be jeopardized by heat sources during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-688 - The Orbiter, subsystems and payload can cause or be jeopardized by heat sources during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-689 - The Orbiter, subsystems and payload can cause or be jeopardized by heat sources during nominal flight from liftoff to LRB burnout. -- This is the design condition. Therefore, this hazard does not appear to be credible. (4 20 88)

LRB-P-O-690 - The Orbiter, subsystems and payload can cause or be jeopardized by heat sources during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (4 20 88)

LRB-P-O-691 - The Orbiter, subsystems and payload can cause or be jeopardized by heat sources during separation of the LRB from the STS vehicle. -- An obvious heat source is the separation motors. However, the change, if any, in the thermal or dynamic loads on the Orbiter is assumed to be slight. (4 20 88)

LRB-P-O-751 - The Orbiter, subsystems and payload can cause or be jeopardized by electrical system malfunction during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-756 - The Orbiter, subsystems and payload can cause or be jeopardized by electrical system malfunction during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-757 - The Orbiter, subsystems and payload can cause or be jeopardized by electrical system malfunction during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-758 - The Orbiter, subsystems and payload can cause or be jeopardized by electrical system malfunction during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-759 - The Orbiter, subsystems and payload can cause or be jeopardized by electrical system malfunction during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-760 - The Orbiter, subsystems and payload can cause or be jeopardized by electrical system malfunction during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be

evaluated. (4 20 88)

LRB-P-O-761 - The Orbiter, subsystems and payload can cause or be jeopardized by electrical system malfunction during nominal flight from liftoff to LRB burnout. -- This hazard is analyzed as A-761. (4 20 88)

LRB-P-O-762 - The Orbiter, subsystems and payload can cause or be jeopardized by electrical system malfunction during intact abort, including RTLS, TAL, AOA and ATO. -- An abort situation could be exacerbated by the hazard analyzed as O-761. (4 20 88)

LRB-P-O-763 - The Orbiter, subsystems and payload can cause or be jeopardized by electrical system malfunction during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-782 - The Orbiter, subsystems and payload can cause or be jeopardized by differential pressure during propellant loading for test or flight. -- This hazard is not credible. (4 20 88)

LRB-P-O-783 - The Orbiter, subsystems and payload can cause or be jeopardized by differential pressure during countdown to liftoff or abort. -- This hazard is not credible. (4 20 88)

LRB-P-O-784 - The Orbiter, subsystems and payload can cause or be jeopardized by differential pressure during launch abort activities, including mission postponement (scrub). -- This hazard is not credible. (4 20 88)

LRB-P-O-785 - The Orbiter, subsystems and payload can cause or be jeopardized by differential pressure during nominal flight from liftoff to LRB burnout. -- Increased wing loading due to the larger booster diameter appears to be adequately addressed in engineering studies and analyses. (4 20 88)

LRB-P-O-786 - The Orbiter, subsystems and payload can cause or be jeopardized by differential pressure during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-787 - The Orbiter, subsystems and payload can cause or be jeopardized by differential pressure during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-799 - The Orbiter, subsystems and payload can cause or be jeopardized by vibration, acoustic loads or shock during flight readiness firing (FRF) of the STS vehicle. -- This hazard is evaluated as O-775. (4 20 88)

LRB-P-O-808 - The Orbiter, subsystems and payload can cause or be jeopardized by vibration, acoustic loads or shock during launch abort activities, including mission

postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-809 - The Orbiter, subsystems and payload can cause or be jeopardized by vibration, acoustic loads or shock during nominal flight from liftoff to LRB burnout. -- This hazard is analyzed with respect to the crew as C-809. The design of the LRB is expected to be constrained by the vibration limits capable of being withstood by the Orbiter and ET. (4 20 88)

LRB-P-O-810 - The Orbiter, subsystems and payload can cause or be jeopardized by vibration, acoustic loads or shock during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-811 - The Orbiter, subsystems and payload can cause or be jeopardized by vibration, acoustic loads or shock during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-823 - The Orbiter, subsystems and payload can cause or be jeopardized by structural loads during flight readiness firing (FRF) of the STS vehicle. -- Structural loads on the Orbiter during FRF are not expected to be significantly different than those for FRF using SRBs. (4 20 88)

LRB-P-O-828 - The Orbiter, subsystems and payload can cause or be jeopardized by structural loads during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (4 20 88)

LRB-P-O-829 - The Orbiter, subsystems and payload can cause or be jeopardized by structural loads during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 20 88)

LRB-P-O-830 - The Orbiter, subsystems and payload can cause or be jeopardized by structural loads during propellant loading for test or flight. -- This hazard is not credible. (4 20 88)

LRB-P-O-831 - The Orbiter, subsystems and payload can cause or be jeopardized by structural loads during countdown to liftoff or abort. -- This hazard is not credible. (4 20 88)

LRB-P-O-832 - The Orbiter, subsystems and payload can cause or be jeopardized by structural loads during launch abort activities, including mission postponement (scrub). -- This hazard is not credible. (4 20 88)

LRB-P-O-833 - The Orbiter, subsystems and payload can cause or be jeopardized by structural loads during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-834 - The Orbiter, subsystems and payload can cause or be jeopardized by structural loads during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-835 - The Orbiter, subsystems and payload can cause or be jeopardized by structural loads during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 20 88)

LRB-P-O-847 - The Orbiter, subsystems and payload can cause or be jeopardized by leaks during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-852 - The Orbiter, subsystems and payload can cause or be jeopardized by leaks during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (4 20 88)

LRB-P-O-853 - The Orbiter, subsystems and payload can cause or be jeopardized by leaks during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 20 88)

LRB-P-O-855 - The Orbiter, subsystems and payload can cause or be jeopardized by leaks during countdown to liftoff or abort. -- This hazard is analyzed as O-854. (4 20 88)

LRB-P-O-856 - The Orbiter, subsystems and payload can cause or be jeopardized by leaks during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as O-854. (4 20 88)

LRB-P-O-857 - The Orbiter, subsystems and payload can cause or be jeopardized by leaks during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-858 - The Orbiter, subsystems and payload can cause or be jeopardized by leaks during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-859 - The Orbiter, subsystems and payload can cause or be jeopardized by leaks during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-919 - The Orbiter, subsystems and payload can cause or be jeopardized by faulty documentation during flight readiness firing (FRF) of the STS vehicle. -- It is assumed that a complete revision of all documentation will be conducted for the transition from solid to liquid rocked boosters. (4 20 88)

LRB-P-O-924 - The Orbiter, subsystems and payload can cause or be jeopardized

by faulty documentation during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-925 - The Orbiter, subsystems and payload can cause or be jeopardized by faulty documentation during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-926 - The Orbiter, subsystems and payload can cause or be jeopardized by faulty documentation during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-927 - The Orbiter, subsystems and payload can cause or be jeopardized by faulty documentation during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-928 - The Orbiter, subsystems and payload can cause or be jeopardized by faulty documentation during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-929 - The Orbiter, subsystems and payload can cause or be jeopardized by faulty documentation during nominal flight from liftoff to LRB burnout. -- Hazards from this cause would be associated with STS flight rules. It is assumed that these would be completely revised for the transition from solid to liquid rocket boosters. (4 20 88)

LRB-P-O-930 - The Orbiter, subsystems and payload can cause or be jeopardized by faulty documentation during intact abort, including RTLS, TAL, AOA and ATO. -- See the comment for O-929. (4 20 88)

LRB-P-O-931 - The Orbiter, subsystems and payload can cause or be jeopardized by faulty documentation during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-967 - The Orbiter, subsystems and payload can cause or be jeopardized by computer system malfunction during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-972 - The Orbiter, subsystems and payload can cause or be jeopardized by computer system malfunction during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (4 20 88)

LRB-P-O-973 - The Orbiter, subsystems and payload can cause or be jeopardized by computer system malfunction during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 20 88)

LRB-P-O-974 - The Orbiter, subsystems and payload can cause or be jeopardized by computer system malfunction during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-975 - The Orbiter, subsystems and payload can cause or be jeopardized by computer system malfunction during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-976 - The Orbiter, subsystems and payload can cause or be jeopardized by computer system malfunction during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-977 - The Orbiter, subsystems and payload can cause or be jeopardized by computer system malfunction during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-978 - The Orbiter, subsystems and payload can cause or be jeopardized by computer system malfunction during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-979 - The Orbiter, subsystems and payload can cause or be jeopardized by computer system malfunction during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-1039 - The Orbiter, subsystems and payload can cause or be jeopardized by emergencies during flight readiness firing (FRF) of the STS vehicle. -- Any emergency which is likely to jeopardize the LRB will probably jeopardize the Orbiter. However, at this time the kinds of emergencies which might occur, and the appropriate measures to reduce their hazard potential, is largely unknown. (4 20 88)

LRB-P-O-1044 - The Orbiter, subsystems and payload can cause or be jeopardized by emergencies during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-1045 - The Orbiter, subsystems and payload can cause or be jeopardized by emergencies during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-1046 - The Orbiter, subsystems and payload can cause or be jeopardized by emergencies during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-1047 - The Orbiter, subsystems and payload can cause or be jeopardized by emergencies during countdown to liftoff or abort. -- At the current state of maturity,

this hazard cannot be evaluated. (4 20 88)

LRB-P-O-1048 - The Orbiter, subsystems and payload can cause or be jeopardized by emergencies during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-1049 - The Orbiter, subsystems and payload can cause or be jeopardized by emergencies during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-1050 - The Orbiter, subsystems and payload can cause or be jeopardized by emergencies during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-O-1051 - The Orbiter, subsystems and payload can cause or be jeopardized by emergencies during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

THESE HAZARDS WERE CONSIDERED BY THE ANALYST BUT WERE NOT FURTHER ANALYZED FOR THE REASONS GIVEN

LRB-P-P-530 - Propellants and/or propulsion systems can cause or be jeopardized by hazardous environments during manufacture and fabrication of subsystems and components. -- This hazard is not credible. (4 20 88)

LRB-P-P-531 - Propellants and/or propulsion systems can cause or be jeopardized by hazardous environments during inspection and test of the LRB and subsystems. -- This hazard is analyzed as G-531. See also K-579. (4 20 88)

LRB-P-P-532 - Propellants and/or propulsion systems can cause or be jeopardized by hazardous environments during proof test of pressure vessels and structure. -- This hazard is analyzed as G-532. (4 20 88)

LRB-P-P-533 - Propellants and/or propulsion systems can cause or be jeopardized by hazardous environments during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (4 20 88)

LRB-P-P-534 - Propellants and/or propulsion systems can cause or be jeopardized by hazardous environments during test firing of engines and/or the completed booster. -- Hazardous environments would be created by the test firing, but these will be adequately guarded against. Additional hazards could be produced by failures, but a FMEA is not feasible at this stage of maturity. (4 20 88)

LRB-P-P-535 - Propellants and/or propulsion systems can cause or be jeopardized by hazardous environments during flight readiness firing (FRF) of the STS vehicle. -- See comments for P-534. (4 20 88)

LRB-P-P-536 - Propellants and/or propulsion systems can cause or be jeopardized by hazardous environments during preparation for shipment of the booster and ship loose hardware. -- It is not likely that the booster will be shipped with hazardous propellants aboard. (4 20 88)

LRB-P-P-537 - Propellants and/or propulsion systems can cause or be jeopardized by hazardous environments during transportation from manufacture to launch site or after recovery. -- Both RP-1 and LOX are currently transported in large quantities in comparative safety. Since the STS currently uses large quantities of liquid hydrogen as well as LOX, it does not appear that the use of RP-1 will present any significantly greater hazard. (4 20 88)

LRB-P-P-538 - Propellants and/or propulsion systems can cause or be jeopardized by hazardous environments during storage, including storage of major components. -- Hazards associated with the storage of propellants are now adequately controlled at the launch site. (4 20 88)

LRB-P-P-539 - Propellants and/or propulsion systems can cause or be jeopardized by hazardous environments during preflight checkout prior to stacking. -- This hazard is not credible. (4 20 88)

LRB-P-P-540 - Propellants and/or propulsion systems can cause or be jeopardized by hazardous environments during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (4 20 88)

LRB-P-P-541 - Propellants and/or propulsion systems can cause or be jeopardized by hazardous environments during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 20 88)

LRB-P-P-542 - Propellants and/or propulsion systems can cause or be jeopardized by hazardous environments during propellant loading for test or flight. -- This hazard is analyzed as F-943. (4 20 88)

LRB-P-P-543 - Propellants and/or propulsion systems can cause or be jeopardized by hazardous environments during countdown to liftoff or abort. -- This hazard is analyzed as G-991. (4 20 88)

LRB-P-P-544 - Propellants and/or propulsion systems can cause or be jeopardized by hazardous environments during launch abort activities, including mission postponement (scrub). -- This hazard is evaluated asM-592. (4 20 88)

LRB-P-P-545 - Propellants and/or propulsion systems can cause or be jeopardized by hazardous environments during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-P-546 - Propellants and/or propulsion systems can cause or be jeopardized by hazardous environments during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-P-547 - Propellants and/or propulsion systems can cause or be jeopardized by hazardous environments during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-P-548 - Propellants and/or propulsion systems can cause or be jeopardized by hazardous environments during descent from separation to ocean impact. -- This hazard is analyzed as K-788. (4 20 88)

LRB-P-P-549 - Propellants and/or propulsion systems can cause or be jeopardized by hazardous environments during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-P-550 - Propellants and/or propulsion systems can cause or be jeopardized

by hazardous environments during floatation (of recoverable boosters) until recovery. -- This hazard is analyzed as K-694. (4 20 88)

LRB-P-P-551 - Propellants and/or propulsion systems can cause or be jeopardized by hazardous environments during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-P-552 - Propellants and/or propulsion systems can cause or be jeopardized by hazardous environments during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-P-554 - Propellants and/or propulsion systems can cause or be jeopardized by worker overload during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-P-555 - Propellants and/or propulsion systems can cause or be jeopardized by worker overload during inspection and test of the LRB and subsystems. -- This hazard is analyzed as K-579. (4 20 88)

LRB-P-P-556 - Propellants and/or propulsion systems can cause or be jeopardized by worker overload during proof test of pressure vessels and structure. -- This hazard is not credible. (4 20 88)

LRB-P-P-557 - Propellants and/or propulsion systems can cause or be jeopardized by worker overload during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (4 20 88)

LRB-P-P-558 - Propellants and/or propulsion systems can cause or be jeopardized by worker overload during test firing of engines and/or the completed booster. -- This hazard is analyzed as F-559. (4 20 88)

LRB-P-P-559 - Propellants and/or propulsion systems can cause or be jeopardized by worker overload during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as F-559. (4 20 88)

LRB-P-P-560 - Propellants and/or propulsion systems can cause or be jeopardized by worker overload during preparation for shipment of the booster and ship loose hardware. -- This hazard is not credible. (4 20 88)

LRB-P-P-561 - Propellants and/or propulsion systems can cause or be jeopardized by worker overload during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (4 20 88)

LRB-P-P-562 - Propellants and/or propulsion systems can cause or be jeopardized

by worker overload during storage, including storage of major components. -- This hazard is not credible. (4 20 88)

LRB-P-P-563 - Propellants and/or propulsion systems can cause or be jeopardized by worker overload during preflight checkout prior to stacking. -- This hazard is not credible. (4 20 88)

LRB-P-P-564 - Propellants and/or propulsion systems can cause or be jeopardized by worker overload during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (4 20 88)

LRB-P-P-565 - Propellants and/or propulsion systems can cause or be jeopardized by worker overload during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 20 88)

LRB-P-P-566 - Propellants and/or propulsion systems can cause or be jeopardized by worker overload during propellant loading for test or flight. -- This hazard is analyzed as G-991. (4 20 88)

LRB-P-P-567 - Propellants and/or propulsion systems can cause or be jeopardized by worker overload during countdown to liftoff or abort. -- This hazard is analyzed as G-991. (4 20 88)

LRB-P-P-568 - Propellants and/or propulsion systems can cause or be jeopardized by worker overload during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-P-574 - Propellants and/or propulsion systems can cause or be jeopardized by worker overload during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 20 88)

LRB-P-P-575 - Propellants and/or propulsion systems can cause or be jeopardized by worker overload during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-P-576 - Propellants and/or propulsion systems can cause or be jeopardized by worker overload during refurbishment of reusable components. -- This hazard is not credible. (4 20 88)

LRB-P-P-578 - Propellants and/or propulsion systems can cause or be jeopardized by unsafe or unhygienic working conditions during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-P-579 - Propellants and/or propulsion systems can cause or be jeopardized

by unsafe or unhygienic working conditions during inspection and test of the LRB and subsystems. -- This hazard is analyzed as K-579 for cryogens. Hazards associated with the handling of RP-1 are well known and controlled in a variety of industries. Therefore, this hazard appears to be adequately controlled. (4 20 88)

LRB-P-P-580 - Propellants and/or propulsion systems can cause or be jeopardized by unsafe or unhygienic working conditions during proof test of pressure vessels and structure. -- This hazard is analyzed as G-532. (4 20 88)

LRB-P-P-581 - Propellants and/or propulsion systems can cause or be jeopardized by unsafe or unhygienic working conditions during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (4 20 88)

LRB-P-P-582 - Propellants and/or propulsion systems can cause or be jeopardized by unsafe or unhygienic working conditions during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-P-583 - Propellants and/or propulsion systems can cause or be jeopardized by unsafe or unhygienic working conditions during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-P-584 - Propellants and/or propulsion systems can cause or be jeopardized by unsafe or unhygienic working conditions during preparation for shipment of the booster and ship loose hardware. -- This hazard is not credible. (4 20 88)

LRB-P-P-585 - Propellants and/or propulsion systems can cause or be jeopardized by unsafe or unhygienic working conditions during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-P-586 - Propellants and/or propulsion systems can cause or be jeopardized by unsafe or unhygienic working conditions during storage, including storage of major components. -- If tanks are pressurized with any gas other than air, leakage could produce a hazard. However, this hazard appears to be adequately controlled. (4 20 88)

LRB-P-P-587 - Propellants and/or propulsion systems can cause or be jeopardized by unsafe or unhygienic working conditions during preflight checkout prior to stacking. -- This hazard is analyzed as F-588. (4 20 88)

LRB-P-P-588 - Propellants and/or propulsion systems can cause or be jeopardized by unsafe or unhygienic working conditions during vehicle stacking, including ancillary test activities. -- This hazard is analyzed as F-588. (4 20 88)

LRB-P-P-589 - Propellants and/or propulsion systems can cause or be jeopardized by unsafe or unhygienic working conditions during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 20 88)

LRB-P-P-590 - Propellants and/or propulsion systems can cause or be jeopardized by unsafe or unhygienic working conditions during propellant loading for test or flight. -- This hazard is analyzed as C-590. (4 20 88)

LRB-P-P-591 - Propellants and/or propulsion systems can cause or be jeopardized by unsafe or unhygienic working conditions during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-P-592 - Propellants and/or propulsion systems can cause or be jeopardized by unsafe or unhygienic working conditions during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-P-598 - Propellants and/or propulsion systems can cause or be jeopardized by unsafe or unhygienic working conditions during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 20 88)

LRB-P-P-599 - Propellants and/or propulsion systems can cause or be jeopardized by unsafe or unhygienic working conditions during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 20 88)

LRB-P-P-600 - Propellants and/or propulsion systems can cause or be jeopardized by unsafe or unhygienic working conditions during refurbishment of reusable components. -- This hazard is not credible. (4 20 88)

LRB-P-P-650 - Propellants and/or propulsion systems can cause or be jeopardized by contamination during manufacture and fabrication of subsystems and components. -- This hazard is analyzed as K-650. (4 21 88)

LRB-P-P-651 - Propellants and/or propulsion systems can cause or be jeopardized by contamination during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 21 88)

LRB-P-P-652 - Propellants and/or propulsion systems can cause or be jeopardized by contamination during proof test of pressure vessels and structure. -- It is assumed that proof test media will be compatible with the propellant concerned. (4 21 88)

LRB-P-P-653 - Propellants and/or propulsion systems can cause or be jeopardized by contamination during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (4 22 88)

LRB-P-P-654 - Propellants and/or propulsion systems can cause or be jeopardized by contamination during test firing of engines and/or the completed booster. -- This hazard is analyzed as K-650. (4 22 88)

LRB-P-P-655 - Propellants and/or propulsion systems can cause or be jeopardized by contamination during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as K-650. (4 22 88)

LRB-P-P-656 - Propellants and/or propulsion systems can cause or be jeopardized by contamination during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-657 - Propellants and/or propulsion systems can cause or be jeopardized by contamination during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-658 - Propellants and/or propulsion systems can cause or be jeopardized by contamination during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-659 - Propellants and/or propulsion systems can cause or be jeopardized by contamination during preflight checkout prior to stacking. -- This hazard is not credible. (4 22 88)

LRB-P-P-660 - Propellants and/or propulsion systems can cause or be jeopardized by contamination during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (4 22 88)

LRB-P-P-661 - Propellants and/or propulsion systems can cause or be jeopardized by contamination during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 22 88)

LRB-P-P-662 - Propellants and/or propulsion systems can cause or be jeopardized by contamination during propellant loading for test or flight. -- This hazard is not credible. (4 22 88)

LRB-P-P-663 - Propellants and/or propulsion systems can cause or be jeopardized by contamination during countdown to liftoff or abort. -- This hazard is not credible. (4 22 88)

LRB-P-P-664 - Propellants and/or propulsion systems can cause or be jeopardized by contamination during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-665 - Propellants and/or propulsion systems can cause or be jeopardized by contamination during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (4 22 88)

LRB-P-P-666 - Propellants and/or propulsion systems can cause or be jeopardized by contamination during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (4 22 88)

LRB-P-P-667 - Propellants and/or propulsion systems can cause or be jeopardized by contamination during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 22 88)

LRB-P-P-668 - Propellants and/or propulsion systems can cause or be jeopardized by contamination during descent from separation to ocean impact. -- This hazard is not credible. (4 22 88)

LRB-P-P-669 - Propellants and/or propulsion systems can cause or be jeopardized by contamination during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 22 88)

LRB-P-P-670 - Propellants and/or propulsion systems can cause or be jeopardized by contamination during floatation (of recoverable boosters) until recovery. -- It is assumed that the booster will be protected from the contaminating effects of seawater. (4 22 88)

LRB-P-P-671 - Propellants and/or propulsion systems can cause or be jeopardized by contamination during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (4 22 88)

LRB-P-P-672 - Propellants and/or propulsion systems can cause or be jeopardized by contamination during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-678 - Propellants and/or propulsion systems can cause or be jeopardized by heat sources during test firing of engines and/or the completed booster. -- This hazard is analyzed as K-679. (4 22 88)

LRB-P-P-679 - Propellants and/or propulsion systems can cause or be jeopardized by heat sources during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as K-679. (4 22 88)

LRB-P-P-681 - Propellants and/or propulsion systems can cause or be jeopardized by heat sources during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (4 22 88)

LRB-P-P-682 - Propellants and/or propulsion systems can cause or be jeopardized

by heat sources during storage, including storage of major components. -- This hazard is not credible. (4 22 88)

LRB-P-P-685 - Propellants and/or propulsion systems can cause or be jeopardized by heat sources during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 22 88)

LRB-P-P-686 - Propellants and/or propulsion systems can cause or be jeopardized by heat sources during propellant loading for test or flight. -- This hazard is analyzed as K-734. (4 22 88)

LRB-P-P-687 - Propellants and/or propulsion systems can cause or be jeopardized by heat sources during countdown to liftoff or abort. -- This hazard is analyzed as K-735. (4 22 88)

LRB-P-P-688 - Propellants and/or propulsion systems can cause or be jeopardized by heat sources during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-689 - Propellants and/or propulsion systems can cause or be jeopardized by heat sources during nominal flight from liftoff to LRB burnout. -- This hazard is analyzed as D-689. (4 22 88)

LRB-P-P-690 - Propellants and/or propulsion systems can cause or be jeopardized by heat sources during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is analyzed as D-689. (4 22 88)

LRB-P-P-691 - Propellants and/or propulsion systems can cause or be jeopardized by heat sources during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-692 - Propellants and/or propulsion systems can cause or be jeopardized by heat sources during descent from separation to ocean impact. -- This hazard is not credible. (4 22 88)

LRB-P-P-724 - Propellants and/or propulsion systems can cause or be jeopardized by moisture or precipitation during proof test of pressure vessels and structure. -- This hazard is not credible. (4 22 88)

LRB-P-P-726 - Propellants and/or propulsion systems can cause or be jeopardized by moisture or precipitation during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-727 - Propellants and/or propulsion systems can cause or be jeopardized by moisture or precipitation during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-729 - Propellants and/or propulsion systems can cause or be jeopardized by moisture or precipitation during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-730 - Propellants and/or propulsion systems can cause or be jeopardized by moisture or precipitation during storage, including storage of major components. -- This hazard is not credible. (4 22 88)

LRB-P-P-731 - Propellants and/or propulsion systems can cause or be jeopardized by moisture or precipitation during preflight checkout prior to stacking. -- This hazard is not credible. (4 22 88)

LRB-P-P-732 - Propellants and/or propulsion systems can cause or be jeopardized by moisture or precipitation during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (4 22 88)

LRB-P-P-733 - Propellants and/or propulsion systems can cause or be jeopardized by moisture or precipitation during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-734 - Propellants and/or propulsion systems can cause or be jeopardized by moisture or precipitation during propellant loading for test or flight. -- This hazard is analyzed as K-734. (4 22 88)

LRB-P-P-735 - Propellants and/or propulsion systems can cause or be jeopardized by moisture or precipitation during countdown to liftoff or abort. -- This hazard is analyzed as K-735. (4 22 88)

LRB-P-P-736 - Propellants and/or propulsion systems can cause or be jeopardized by moisture or precipitation during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-737 - Propellants and/or propulsion systems can cause or be jeopardized by moisture or precipitation during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-738 - Propellants and/or propulsion systems can cause or be jeopardized by moisture or precipitation during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-739 - Propellants and/or propulsion systems can cause or be jeopardized by moisture or precipitation during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 22 88)

LRB-P-P-740 - Propellants and/or propulsion systems can cause or be jeopardized by moisture or precipitation during descent from separation to ocean impact. -- This hazard is not credible. (4 22 88)

LRB-P-P-741 - Propellants and/or propulsion systems can cause or be jeopardized by moisture or precipitation during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-742 - Propellants and/or propulsion systems can cause or be jeopardized by moisture or precipitation during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-743 - Propellants and/or propulsion systems can cause or be jeopardized by moisture or precipitation during recovery activities, including towing, and retrieval of recoverables. --At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-744 - Propellants and/or propulsion systems can cause or be jeopardized by moisture or precipitation during refurbishment of reusable components. -- This hazard is not credible. (4 22 88)

LRB-P-P-746 - Propellants and/or propulsion systems can cause or be jeopardized by electrical system malfunction during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-747 - Propellants and/or propulsion systems can cause or be jeopardized by electrical system malfunction during inspection and test of the LRB and subsystems. -- To the extent to which it applies, this hazard is analyzed as E-747. (4 22 88)

LRB-P-P-748 - Propellants and/or propulsion systems can cause or be jeopardized by electrical system malfunction during proof test of pressure vessels and structure. -- This hazard is analyzed as G-748. (4 22 88)

LRB-P-P-749 - Propellants and/or propulsion systems can cause or be jeopardized by electrical system malfunction during acceptance test and checkout prior to delivery to the Government. -- To the extent to which it applies, this hazard is analyzed as E-747. (4 22 88)

LRB-P-P-751 - Propellants and/or propulsion systems can cause or be jeopardized by electrical system malfunction during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as P-750. (4 22 88)

LRB-P-P-752 - Propellants and/or propulsion systems can cause or be jeopardized

by electrical system malfunction during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-753 - Propellants and/or propulsion systems can cause or be jeopardized by electrical system malfunction during transportation from manufacture to launch site or after recovery. -- This hazard is analyzed as G-753. (4 22 88)

LRB-P-P-754 - Propellants and/or propulsion systems can cause or be jeopardized by electrical system malfunction during storage, including storage of major components. -- This hazard is not credible. (4 22 88)

LRB-P-P-755 - Propellants and/or propulsion systems can cause or be jeopardized by electrical system malfunction during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-756 - Propellants and/or propulsion systems can cause or be jeopardized by electrical system malfunction during vehicle stacking, including ancillary test activities. -- This hazard is analyzed as E-747. (4 22 88)

LRB-P-P-757 - Propellants and/or propulsion systems can cause or be jeopardized by electrical system malfunction during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-758 - Propellants and/or propulsion systems can cause or be jeopardized by electrical system malfunction during propellant loading for test or flight. -- This hazard is analyzed as E-758. (4 22 88)

LRB-P-P-759 - Propellants and/or propulsion systems can cause or be jeopardized by electrical system malfunction during countdown to liftoff or abort. -- This hazard is analyzed as E-759. (4 22 88)

LRB-P-P-760 - Propellants and/or propulsion systems can cause or be jeopardized by electrical system malfunction during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-761 - Propellants and/or propulsion systems can cause or be jeopardized by electrical system malfunction during nominal flight from liftoff to LRB burnout. -- This hazard is related to those analyzed as E-776 and E-798. (4 22 88)

LRB-P-P-762 - Propellants and/or propulsion systems can cause or be jeopardized by electrical system malfunction during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-763 - Propellants and/or propulsion systems can cause or be jeopardized by electrical system malfunction during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 22 88)

LRB-P-P-764 - Propellants and/or propulsion systems can cause or be jeopardized by electrical system malfunction during descent from separation to ocean impact. -- This hazard is not credible. (4 22 88)

LRB-P-P-765 - Propellants and/or propulsion systems can cause or be jeopardized by electrical system malfunction during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 22 88)

LRB-P-P-766 - Propellants and/or propulsion systems can cause or be jeopardized by electrical system malfunction during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 22 88)

LRB-P-P-767 - Propellants and/or propulsion systems can cause or be jeopardized by electrical system malfunction during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (4 22 88)

LRB-P-P-768 - Propellants and/or propulsion systems can cause or be jeopardized by electrical system malfunction during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-772 - Propellants and/or propulsion systems can cause or be jeopardized by differential pressure during proof test of pressure vessels and structure. -- This hazard is analyzed as G-532. (4 22 88)

LRB-P-P-774 - Propellants and/or propulsion systems can cause or be jeopardized by differential pressure during test firing of engines and/or the completed booster. -- This hazard is analyzed as G-774. (4 22 88)

LRB-P-P-775 - Propellants and/or propulsion systems can cause or be jeopardized by differential pressure during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as G-774. (4 22 88)

LRB-P-P-777 - Propellants and/or propulsion systems can cause or be jeopardized by differential pressure during transportation from manufacture to launch site or after recovery. -- This hazard is analyzed as K-776. (4 22 88)

LRB-P-P-778 - Propellants and/or propulsion systems can cause or be jeopardized by differential pressure during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-782 - Propellants and/or propulsion systems can cause or be jeopardized by differential pressure during propellant loading for test or flight. -- This hazard is

analyzed as K-782. (4 22 88)

LRB-P-P-783 - Propellants and/or propulsion systems can cause or be jeopardized by differential pressure during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-784 - Propellants and/or propulsion systems can cause or be jeopardized by differential pressure during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-785 - Propellants and/or propulsion systems can cause or be jeopardized by differential pressure during nominal flight from liftoff to LRB burnout. -- Bias of the electropneumatic ullage pressure sensors is discussed in E-775 and E-776. (4 22 88)

LRB-P-P-786 - Propellants and/or propulsion systems can cause or be jeopardized by differential pressure during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is analyzed as M-786. (4 22 88)

LRB-P-P-787 - Propellants and/or propulsion systems can cause or be jeopardized by differential pressure during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-788 - Propellants and/or propulsion systems can cause or be jeopardized by differential pressure during descent from separation to ocean impact. -- This hazard is analyzed as K-788. (4 22 88)

LRB-P-P-789 - Propellants and/or propulsion systems can cause or be jeopardized by differential pressure during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-790 - Propellants and/or propulsion systems can cause or be jeopardized by differential pressure during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-791 - Propellants and/or propulsion systems can cause or be jeopardized by differential pressure during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-798 - Propellants and/or propulsion systems can cause or be jeopardized by vibration, acoustic loads or shock during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-799 - Propellants and/or propulsion systems can cause or be jeopardized by vibration, acoustic loads or shock during flight readiness firing (FRF) of the STS vehicle. -- False readings of electropneumatic pressure sensors are discussed in E-775, E-776, E-787 and E-789. (4 22 88)

LRB-P-P-801 - Propellants and/or propulsion systems can cause or be jeopardized by vibration, acoustic loads or shock during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-808 - Propellants and/or propulsion systems can cause or be jeopardized by vibration, acoustic loads or shock during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-809 - Propellants and/or propulsion systems can cause or be jeopardized by vibration, acoustic loads or shock during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-810 - Propellants and/or propulsion systems can cause or be jeopardized by vibration, acoustic loads or shock during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-811 - Propellants and/or propulsion systems can cause or be jeopardized by vibration, acoustic loads or shock during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-812 - Propellants and/or propulsion systems can cause or be jeopardized by vibration, acoustic loads or shock during descent from separation to ocean impact. -- This hazard is not credible. (4 22 88)

LRB-P-P-813 - Propellants and/or propulsion systems can cause or be jeopardized by vibration, acoustic loads or shock during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-815 - Propellants and/or propulsion systems can cause or be jeopardized by vibration, acoustic loads or shock during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (4 22 88)

LRB-P-P-843 - Propellants and/or propulsion systems can cause or be jeopardized by leaks during inspection and test of the LRB and subsystems. -- This hazard is analyzed as K-002. (4 22 88)

LRB-P-P-844 - Propellants and/or propulsion systems can cause or be jeopardized

by leaks during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-845 - Propellants and/or propulsion systems can cause or be jeopardized by leaks during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-846 - Propellants and/or propulsion systems can cause or be jeopardized by leaks during test firing of engines and/or the completed booster. -- This hazard is analyzed as K-847 and F-943. (4 22 88)

LRB-P-P-847 - Propellants and/or propulsion systems can cause or be jeopardized by leaks during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as K-847 and F-943. (4 22 88)

LRB-P-P-849 - Propellants and/or propulsion systems can cause or be jeopardized by leaks during transportation from manufacture to launch site or after recovery. -- This hazard is analyzed as K-776. (4 22 88)

LRB-P-P-850 - Propellants and/or propulsion systems can cause or be jeopardized by leaks during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-851 - Propellants and/or propulsion systems can cause or be jeopardized by leaks during preflight checkout prior to stacking. -- This hazard is not credible. (4 22 88)

LRB-P-P-852 - Propellants and/or propulsion systems can cause or be jeopardized by leaks during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (4 22 88)

LRB-P-P-853 - Propellants and/or propulsion systems can cause or be jeopardized by leaks during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 22 88)

LRB-P-P-854 - Propellants and/or propulsion systems can cause or be jeopardized by leaks during propellant loading for test or flight. -- This hazard is analyzed as E-854. (4 22 88)

LRB-P-P-855 - Propellants and/or propulsion systems can cause or be jeopardized by leaks during countdown to liftoff or abort. -- This hazard is analyzed as E-854. (4 22 88)

LRB-P-P-856 - Propellants and/or propulsion systems can cause or be jeopardized by leaks during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as K-847 and F-943. (4 22 88)

LRB-P-P-857 - Propellants and/or propulsion systems can cause or be jeopardized by leaks during nominal flight from liftoff to LRB burnout. -- This hazard is analyzed as K-847 and F-943. (4 22 88)

LRB-P-P-858 - Propellants and/or propulsion systems can cause or be jeopardized by leaks during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-859 - Propellants and/or propulsion systems can cause or be jeopardized by leaks during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-860 - Propellants and/or propulsion systems can cause or be jeopardized by leaks during descent from separation to ocean impact. -- This hazard is analyzed as K-788. (4 22 88)

LRB-P-P-861 - Propellants and/or propulsion systems can cause or be jeopardized by leaks during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-862 - Propellants and/or propulsion systems can cause or be jeopardized by leaks during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-863 - Propellants and/or propulsion systems can cause or be jeopardized by leaks during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-864 - Propellants and/or propulsion systems can cause or be jeopardized by leaks during refurbishment of reusable components. -- This hazard is not credible. (4 22 88)

LRB-P-P-870 - Propellants and/or propulsion systems can cause or be jeopardized by propellant characteristics and products during test firing of engines and/or the completed booster. -- Propulsion systems will be designed for characteristics of the propellants employed. LOX and RP-1 are well known propellants having relatively benign characteristics. This hazard is therefore not credible. (4 22 88)

LRB-P-P-871 - Propellants and/or propulsion systems can cause or be jeopardized by propellant characteristics and products during flight readiness firing (FRF) of the STS vehicle. -- Propulsion systems will be designed for characteristics of the propellants employed. LOX and RP-1 are well known propellants having relatively benign characteristics. This hazard is therefore not credible. (4 22 88)

LRB-P-P-873 - Propellants and/or propulsion systems can cause or be jeopardized by propellant characteristics and products during transportation from manufacture to

launch site or after recovery. -- Propulsion systems will be designed for characteristics of the propellants employed. LOX and RP-1 are well known propellants having relatively benign characteristics. This hazard is therefore not credible. (4 22 88)

LRB-P-P-874 - Propellants and/or propulsion systems can cause or be jeopardized by propellant characteristics and products during storage, including storage of major components. -- Propulsion systems will be designed for characteristics of the propellants employed. LOX and RP-1 are well known propellants having relatively benign characteristics. This hazard is therefore not credible. (4 22 88)

LRB-P-P-877 - Propellants and/or propulsion systems can cause or be jeopardized by propellant characteristics and products during rollout from the VAB and preloading preparation. -- Propulsion systems will be designed for characteristics of the propellants employed. LOX and RP-1 are well known propellants having relatively benign characteristics. This hazard is therefore not credible. (4 22 88)

LRB-P-P-878 - Propellants and/or propulsion systems can cause or be jeopardized by propellant characteristics and products during propellant loading for test or flight. -- Propulsion systems will be designed for characteristics of the propellants employed. LOX and RP-1 are well known propellants having relatively benign characteristics. This hazard is therefore not credible. (4 22 88)

LRB-P-P-879 - Propellants and/or propulsion systems can cause or be jeopardized by propellant characteristics and products during countdown to liftoff or abort. -- Propulsion systems will be designed for characteristics of the propellants employed. LOX and RP-1 are well known propellants having relatively benign characteristics. This hazard is therefore not credible. (4 22 88)

LRB-P-P-880 - Propellants and/or propulsion systems can cause or be jeopardized by propellant characteristics and products during launch abort activities, including mission postponement (scrub). -- Propulsion systems will be designed for characteristics of the propellants employed. LOX and RP-1 are well known propellants having relatively benign characteristics. This hazard is therefore not credible. (4 22 88)

LRB-P-P-881 - Propellants and/or propulsion systems can cause or be jeopardized by propellant characteristics and products during nominal flight from liftoff to LRB burnout. -- Propulsion systems will be designed for characteristics of the propellants employed. LOX and RP-1 are well known propellants having relatively benign characteristics. This hazard is therefore not credible. (4 22 88)

LRB-P-P-882 - Propellants and/or propulsion systems can cause or be jeopardized by propellant characteristics and products during intact abort, including RTLS, TAL, AOA and ATO. -- Propulsion systems will be designed for characteristics of the propellants employed. LOX and RP-1 are well known propellants having relatively

benign characteristics. This hazard is therefore not credible. (4 22 88)

LRB-P-P-883 - Propellants and/or propulsion systems can cause or be jeopardized by propellant characteristics and products during separation of the LRB from the STS vehicle. -- Propulsion systems will be designed for characteristics of the propellants employed. LOX and RP-1 are well known propellants having relatively benign characteristics. This hazard is therefore not credible. (4 22 88)

LRB-P-P-884 - Propellants and/or propulsion systems can cause or be jeopardized by propellant characteristics and products during descent from separation to ocean impact. -- Propulsion systems will be designed for characteristics of the propellants employed. LOX and RP-1 are well known propellants having relatively benign characteristics. This hazard is therefore not credible. (4 22 88)

LRB-P-P-885 - Propellants and/or propulsion systems can cause or be jeopardized by propellant characteristics and products during splashdown events occuring at impact (disposable for expendables). -- Propulsion systems will be designed for characteristics of the propellants employed. LOX and RP-1 are well known propellants having relatively benign characteristics. This hazard is therefore not credible. (4 22 88)

LRB-P-P-886 - Propellants and/or propulsion systems can cause or be jeopardized by propellant characteristics and products during floatation (of recoverable boosters) until recovery. -- Propulsion systems will be designed for characteristics of the propellants employed. LOX and RP-1 are well known propellants having relatively benign characteristics. This hazard is therefore not credible. (4 22 88)

LRB-P-P-887 - Propellants and/or propulsion systems can cause or be jeopardized by propellant characteristics and products during recovery activities, including towing, and retrieval of recoverables. -- Propulsion systems will be designed for characteristics of the propellants employed. LOX and RP-1 are well known propellants having relatively benign characteristics. This hazard is therefore not credible. (4 22 88)

LRB-P-P-888 - Propellants and/or propulsion systems can cause or be jeopardized by propellant characteristics and products during refurbishment of reusable components. -- Propulsion systems will be designed for characteristics of the propellants employed. LOX and RP-1 are well known propellants having relatively benign characteristics. This hazard is therefore not credible. (4 22 88)

LRB-P-P-894 - Propellants and/or propulsion systems can cause or be jeopardized by lightning or electromagnetic discharge during test firing of engines and/or the completed booster. -- It is anticipated that test firing will not take place when there is danger from lightning. (4 22 88)

LRB-P-P-895 - Propellants and/or propulsion systems can cause or be jeopardized

by lightning or electromagnetic discharge during flight readiness firing (FRF) of the STS vehicle. -- It is anticipated that test firing will not take place when there is danger from lightning. (4 22 88)

LRB-P-P-898 - Propellants and/or propulsion systems can cause or be jeopardized by lightning or electromagnetic discharge during storage, including storage of major components. -- This hazard is not credible. (4 22 88)

LRB-P-P-901 - Propellants and/or propulsion systems can cause or be jeopardized by lightning or electromagnetic discharge during rollout from the VAB and preloading preparation. -- See comments for P-897. (4 22 88)

LRB-P-P-902 - Propellants and/or propulsion systems can cause or be jeopardized by lightning or electromagnetic discharge during propellant loading for test or flight. -- This hazard is analyzed as K-902. (4 22 88)

LRB-P-P-903 - Propellants and/or propulsion systems can cause or be jeopardized by lightning or electromagnetic discharge during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-904 - Propellants and/or propulsion systems can cause or be jeopardized by lightning or electromagnetic discharge during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-905 - Propellants and/or propulsion systems can cause or be jeopardized by lightning or electromagnetic discharge during nominal flight from liftoff to LRB burnout. -- This hazard is analyzed as E-905 (4 22 88)

LRB-P-P-906 - Propellants and/or propulsion systems can cause or be jeopardized by lightning or electromagnetic discharge during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is analyzed as E-905 (4 22 88)

LRB-P-P-908 - Propellants and/or propulsion systems can cause or be jeopardized by lightning or electromagnetic discharge during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-909 - Propellants and/or propulsion systems can cause or be jeopardized by lightning or electromagnetic discharge during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-910 - Propellants and/or propulsion systems can cause or be jeopardized by lightning or electromagnetic discharge during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-911 - Propellants and/or propulsion systems can cause or be jeopardized by lightning or electromagnetic discharge during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-913 - Propellants and/or propulsion systems can cause or be jeopardized by faulty documentation during component or material purchase, including acquisition of GFP. -- This hazard is not credible. (4 22 88)

LRB-P-P-914 - Propellants and/or propulsion systems can cause or be jeopardized by faulty documentation during manufacture and fabrication of subsystems and components. -- This hazard is not credible. (4 22 88)

LRB-P-P-915 - Propellants and/or propulsion systems can cause or be jeopardized by faulty documentation during inspection and test of the LRB and subsystems. -- Although faulty test documentation is an obvious hazard, it appears to be adequately controllable by safeguards now commonly used in the aerospace industry. (4 22 88)

LRB-P-P-916 - Propellants and/or propulsion systems can cause or be jeopardized by faulty documentation during proof test of pressure vessels and structure. -- See comment for P-915. (4 22 88)

LRB-P-P-917 - Propellants and/or propulsion systems can cause or be jeopardized by faulty documentation during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-918 - Propellants and/or propulsion systems can cause or be jeopardized by faulty documentation during test firing of engines and/or the completed booster. -- See comment for P-915. (4 22 88)

LRB-P-P-919 - Propellants and/or propulsion systems can cause or be jeopardized by faulty documentation during flight readiness firing (FRF) of the STS vehicle. -- See comment for P-915. (4 22 88)

LRB-P-P-920 - Propellants and/or propulsion systems can cause or be jeopardized by faulty documentation during preparation for shipment of the booster and ship loose hardware. -- See comment for P-915. (4 22 88)

LRB-P-P-921 - Propellants and/or propulsion systems can cause or be jeopardized by faulty documentation during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (4 22 88)

LRB-P-P-922 - Propellants and/or propulsion systems can cause or be jeopardized by faulty documentation during storage, including storage of major components. --

This hazard is not credible. (4 22 88)

LRB-P-P-923 - Propellants and/or propulsion systems can cause or be jeopardized by faulty documentation during preflight checkout prior to stacking. -- See comment for P-915. (4 22 88)

LRB-P-P-924 - Propellants and/or propulsion systems can cause or be jeopardized by faulty documentation during vehicle stacking, including ancillary test activities. -- See comment for P-915. (4 22 88)

LRB-P-P-925 - Propellants and/or propulsion systems can cause or be jeopardized by faulty documentation during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 22 88)

LRB-P-P-926 - Propellants and/or propulsion systems can cause or be jeopardized by faulty documentation during propellant loading for test or flight. -- Although faulty operational documentation is an obvious hazard, this appears to be adequately controlled by review of procedures for STS flights using LRBs. (4 22 88)

LRB-P-P-927 - Propellants and/or propulsion systems can cause or be jeopardized by faulty documentation during countdown to liftoff or abort. -- See comment for P-926. (4 22 88)

LRB-P-P-928 - Propellants and/or propulsion systems can cause or be jeopardized by faulty documentation during launch abort activities, including mission postponement (scrub). -- See comment for P-926. (4 22 88)

LRB-P-P-929 - Propellants and/or propulsion systems can cause or be jeopardized by faulty documentation during nominal flight from liftoff to LRB burnout. -- This appears to be a hazard associated with operational flight rules, which will be completely revised for the STS using LRBs. (4 22 88)

LRB-P-P-930 - Propellants and/or propulsion systems can cause or be jeopardized by faulty documentation during intact abort, including RTLS, TAL, AOA and ATO. -- This appears to be a hazard associated with operational flight rules, which will be completely revised for the STS using LRBs. (4 22 88)

LRB-P-P-931 - Propellants and/or propulsion systems can cause or be jeopardized by faulty documentation during separation of the LRB from the STS vehicle. -- This appears to be a hazard associated with operational flight rules, which will be completely revised for the STS using LRBs. (4 22 88)

LRB-P-P-935 - Propellants and/or propulsion systems can cause or be jeopardized by faulty documentation during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-936 - Propellants and/or propulsion systems can cause or be jeopardized by faulty documentation during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-938 - Propellants and/or propulsion systems can cause or be jeopardized by chemical activity during manufacture and fabrication of subsystems and components. -- This hazard is not credible. (4 22 88)

LRB-P-P-939 - Propellants and/or propulsion systems can cause or be jeopardized by chemical activity during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-940 - Propellants and/or propulsion systems can cause or be jeopardized by chemical activity during proof test of pressure vessels and structure. -- This hazard is not credible. (4 22 88)

LRB-P-P-941 - Propellants and/or propulsion systems can cause or be jeopardized by chemical activity during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (4 22 88)

LRB-P-P-942 - Propellants and/or propulsion systems can cause or be jeopardized by chemical activity during test firing of engines and/or the completed booster. -- This hazard is analyzed as F-943. (4 22 88)

LRB-P-P-943 - Propellants and/or propulsion systems can cause or be jeopardized by chemical activity during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as F-943. (4 22 88)

LRB-P-P-944 - Propellants and/or propulsion systems can cause or be jeopardized by chemical activity during preparation for shipment of the booster and ship loose hardware. -- This hazard is not credible. (4 22 88)

LRB-P-P-945 - Propellants and/or propulsion systems can cause or be jeopardized by chemical activity during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (4 22 88)

LRB-P-P-946 - Propellants and/or propulsion systems can cause or be jeopardized by chemical activity during storage, including storage of major components. -- This hazard is not credible. (4 22 88)

LRB-P-P-947 - Propellants and/or propulsion systems can cause or be jeopardized by chemical activity during preflight checkout prior to stacking. -- This hazard is not credible. (4 22 88)

LRB-P-P-948 - Propellants and/or propulsion systems can cause or be jeopardized by chemical activity during vehicle stacking, including ancillary test activities. -- This

hazard is not credible. (4 22 88)

LRB-P-P-949 - Propellants and/or propulsion systems can cause or be jeopardized by chemical activity during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 22 88)

LRB-P-P-950 - Propellants and/or propulsion systems can cause or be jeopardized by chemical activity during propellant loading for test or flight. -- It is assumed that the propulsion system will be chemically compatible with the propellants at the temperatures and pressures encountered. (4 22 88)

LRB-P-P-951 - Propellants and/or propulsion systems can cause or be jeopardized by chemical activity during countdown to liftoff or abort. -- See the comment for P-950. (4 22 88)

LRB-P-P-952 - Propellants and/or propulsion systems can cause or be jeopardized by chemical activity during launch abort activities, including mission postponement (scrub). -- See the comment for P-950. (4 22 88)

LRB-P-P-953 - Propellants and/or propulsion systems can cause or be jeopardized by chemical activity during nominal flight from liftoff to LRB burnout. -- See the comment for P-950. (4 22 88)

LRB-P-P-954 - Propellants and/or propulsion systems can cause or be jeopardized by chemical activity during intact abort, including RTLS, TAL, AOA and ATO. -- See the comment for P-950. (4 22 88)

LRB-P-P-955 - Propellants and/or propulsion systems can cause or be jeopardized by chemical activity during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 22 88)

LRB-P-P-956 - Propellants and/or propulsion systems can cause or be jeopardized by chemical activity during descent from separation to ocean impact. -- This hazard is not credible. (4 22 88)

LRB-P-P-957 - Propellants and/or propulsion systems can cause or be jeopardized by chemical activity during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 22 88)

LRB-P-P-958 - Propellants and/or propulsion systems can cause or be jeopardized by chemical activity during floatation (of recoverable boosters) until recovery. -- It is assumed that recoverable boosters will be immune to or protected from the corrosive effects of seawater and marine growths. (4 22 88)

LRB-P-P-959 - Propellants and/or propulsion systems can cause or be jeopardized by chemical activity during recovery activities, including towing, and retrieval of

recoverables. -- This hazard is not credible. (4 22 88)

LRB-P-P-960 - Propellants and/or propulsion systems can cause or be jeopardized by chemical activity during refurbishment of reusable components. -- This hazard is not credible. (4 22 88)

LRB-P-P-988 - Propellants and/or propulsion systems can cause or be jeopardized by operator error during proof test of pressure vessels and structure. -- This hazard is analyzed as G-532 and G-748. (4 22 88)

LRB-P-P-989 - Propellants and/or propulsion systems can cause or be jeopardized by operator error during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (4 22 88)

LRB-P-P-990 - Propellants and/or propulsion systems can cause or be jeopardized by operator error during test firing of engines and/or the completed booster. -- This hazard is analyzed as G-991. (4 22 88)

LRB-P-P-991 - Propellants and/or propulsion systems can cause or be jeopardized by operator error during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as G-991. (4 22 88)

LRB-P-P-992 - Propellants and/or propulsion systems can cause or be jeopardized by operator error during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-993 - Propellants and/or propulsion systems can cause or be jeopardized by operator error during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-994 - Propellants and/or propulsion systems can cause or be jeopardized by operator error during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-995 - Propellants and/or propulsion systems can cause or be jeopardized by operator error during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-996 - Propellants and/or propulsion systems can cause or be jeopardized by operator error during vehicle stacking, including ancillary test activities. -- This hazard is analyzed as F-588. (4 22 88)

LRB-P-P-997 - Propellants and/or propulsion systems can cause or be jeopardized by operator error during rollout from the VAB and preloading preparation. -- At the

current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-998 - Propellants and/or propulsion systems can cause or be jeopardized by operator error during propellant loading for test or flight. -- This hazard is analyzed as G-991. (4 22 88)

LRB-P-P-999 - Propellants and/or propulsion systems can cause or be jeopardized by operator error during countdown to liftoff or abort. -- This hazard is analyzed as C-999. (4 22 88)

LRB-P-P-1000 - Propellants and/or propulsion systems can cause or be jeopardized by operator error during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as C-999. (4 22 88)

LRB-P-P-1001 - Propellants and/or propulsion systems can cause or be jeopardized by operator error during nominal flight from liftoff to LRB burnout. -- This hazard is analyzed as C-1001. (4 22 88)

LRB-P-P-1002 - Propellants and/or propulsion systems can cause or be jeopardized by operator error during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is analyzed as C-1001. (4 22 88)

LRB-P-P-1003 - Propellants and/or propulsion systems can cause or be jeopardized by operator error during separation of the LRB from the STS vehicle. -- This hazard is analyzed as C-1001. (4 22 88)

LRB-P-P-1007 - Propellants and/or propulsion systems can cause or be jeopardized by operator error during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-1008 - Propellants and/or propulsion systems can cause or be jeopardized by operator error during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-1034 - Propellants and/or propulsion systems can cause or be jeopardized by emergencies during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-1035 - Propellants and/or propulsion systems can cause or be jeopardized by emergencies during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-1036 - Propellants and/or propulsion systems can cause or be jeopardized by emergencies during proof test of pressure vessels and structure. -- This hazard is analyzed as G-532. (4 22 88)

LRB-P-P-1037 - Propellants and/or propulsion systems can cause or be jeopardized by emergencies during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (4 22 88)

LRB-P-P-1038 - Propellants and/or propulsion systems can cause or be jeopardized by emergencies during test firing of engines and/or the completed booster. -- This hazard is analyzed as F-1039. (4 22 88)

LRB-P-P-1039 - Propellants and/or propulsion systems can cause or be jeopardized by emergencies during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as F-1039. (4 22 88)

LRB-P-P-1040 - Propellants and/or propulsion systems can cause or be jeopardized by emergencies during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-1042 - Propellants and/or propulsion systems can cause or be jeopardized by emergencies during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-1043 - Propellants and/or propulsion systems can cause or be jeopardized by emergencies during preflight checkout prior to stacking. -- This hazard is not credible. (4 22 88)

LRB-P-P-1044 - Propellants and/or propulsion systems can cause or be jeopardized by emergencies during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-1045 - Propellants and/or propulsion systems can cause or be jeopardized by emergencies during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-1046 - Propellants and/or propulsion systems can cause or be jeopardized by emergencies during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-1047 - Propellants and/or propulsion systems can cause or be jeopardized by emergencies during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-1048 - Propellants and/or propulsion systems can cause or be jeopardized by emergencies during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-1049 - Propellants and/or propulsion systems can cause or be jeopardized

by emergencies during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-1050 - Propellants and/or propulsion systems can cause or be jeopardized by emergencies during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-1051 - Propellants and/or propulsion systems can cause or be jeopardized by emergencies during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-1052 - Propellants and/or propulsion systems can cause or be jeopardized by emergencies during descent from separation to ocean impact. -- This hazard is not credible. (4 22 88)

LRB-P-P-1053 - Propellants and/or propulsion systems can cause or be jeopardized by emergencies during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 22 88)

LRB-P-P-1054 - Propellants and/or propulsion systems can cause or be jeopardized by emergencies during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 22 88)

LRB-P-P-1055 - Propellants and/or propulsion systems can cause or be jeopardized by emergencies during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

LRB-P-P-1056 - Propellants and/or propulsion systems can cause or be jeopardized by emergencies during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 22 88)

THESE HAZARDS WERE CONSIDERED BY THE ANALYST BUT WERE NOT FURTHER ANALYZED FOR THE REASONS GIVEN

LRB-P-Q-530 - Crew access provisions can cause or be jeopardized by hazardous environments during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-531 - Crew access provisions can cause or be jeopardized by hazardous environments during inspection and test of the LRB and subsystems. -- This hazard is analyzed as F-559 G-531 and I-579. (4 24 88)

LRB-P-Q-532 - Crew access provisions can cause or be jeopardized by hazardous environments during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-533 - Crew access provisions can cause or be jeopardized by hazardous environments during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-534 - Crew access provisions can cause or be jeopardized by hazardous environments during test firing of engines and/or the completed booster. -- Crew access is not likely to be required during test firing. However, see I-579. (4 24 88)

LRB-P-Q-535 - Crew access provisions can cause or be jeopardized by hazardous environments during flight readiness firing (FRF) of the STS vehicle. -- Crew access is not likely to be required during FRF. (4 24 88)

LRB-P-Q-536 - Crew access provisions can cause or be jeopardized by hazardous environments during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-538 - Crew access provisions can cause or be jeopardized by hazardous environments during storage, including storage of major components. -- This hazard is analyzed as Q-537. (4 24 88)

LRB-P-Q-539 - Crew access provisions can cause or be jeopardized by hazardous environments during preflight checkout prior to stacking. -- This hazard is analyzed as Q-537. (4 24 88)

LRB-P-Q-540 - Crew access provisions can cause or be jeopardized by hazardous environments during vehicle stacking, including ancillary test activities. -- This hazard is analyzed as Q-537. See also G-531, I-579 and F-588. (4 24 88)

LRB-P-Q-541 - Crew access provisions can cause or be jeopardized by hazardous

environments during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-542 - Crew access provisions can cause or be jeopardized by hazardous environments during propellant loading for test or flight. -- This hazard is analyzed as F-559. (4 24 88)

LRB-P-Q-543 - Crew access provisions can cause or be jeopardized by hazardous environments during countdown to liftoff or abort. -- This hazard is F-559. (4 24 88)

LRB-P-Q-544 - Crew access provisions can cause or be jeopardized by hazardous environments during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-551 - Crew access provisions can cause or be jeopardized by hazardous environments during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-552 - Crew access provisions can cause or be jeopardized by hazardous environments during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-554 - Crew access provisions can cause or be jeopardized by worker overload during manufacture and fabrication of subsystems and components. -- This hazard is not credible. (4 24 88)

LRB-P-Q-555 - Crew access provisions can cause or be jeopardized by worker overload during inspection and test of the LRB and subsystems. -- This hazard is analyzed as F-559. (4 24 88)

LRB-P-Q-556 - Crew access provisions can cause or be jeopardized by worker overload during proof test of pressure vessels and structure. -- Access for inspection of the LRB before or after proof test may be hazardous for the reasons discussed in the analysis of I-579. See also G-531 and G-532. (4 24 88)

LRB-P-Q-557 - Crew access provisions can cause or be jeopardized by worker overload during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (4 24 88)

LRB-P-Q-558 - Crew access provisions can cause or be jeopardized by worker overload during test firing of engines and/or the completed booster. -- This hazard is analyzed as F-559. (4 24 88)

LRB-P-Q-559 - Crew access provisions can cause or be jeopardized by worker overload during flight readiness firing (FRF) of the STS vehicle. -- This hazard is

analyzed as F-559. (4 24 88)

LRB-P-Q-560 - Crew access provisions can cause or be jeopardized by worker overload during preparation for shipment of the booster and ship loose hardware. -- This hazard is not credible. (4 24 88)

LRB-P-Q-561 - Crew access provisions can cause or be jeopardized by worker overload during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (4 24 88)

LRB-P-Q-562 - Crew access provisions can cause or be jeopardized by worker overload during storage, including storage of major components. -- This hazard is not credible. (4 24 88)

LRB-P-Q-563 - Crew access provisions can cause or be jeopardized by worker overload during preflight checkout prior to stacking. -- This hazard is analyzed as G-531. (4 24 88)

LRB-P-Q-564 - Crew access provisions can cause or be jeopardized by worker overload during vehicle stacking, including ancillary test activities. -- This hazard is analyzed as F-588. (4 24 88)

LRB-P-Q-565 - Crew access provisions can cause or be jeopardized by worker overload during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-566 - Crew access provisions can cause or be jeopardized by worker overload during propellant loading for test or flight. -- This hazard is analyzed as F-559. (4 24 88)

LRB-P-Q-567 - Crew access provisions can cause or be jeopardized by worker overload during countdown to liftoff or abort. -- This hazard is analyzed as F-559. (4 24 88)

LRB-P-Q-568 - Crew access provisions can cause or be jeopardized by worker overload during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-575 - Crew access provisions can cause or be jeopardized by worker overload during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-576 - Crew access provisions can cause or be jeopardized by worker overload during refurbishment of reusable components. -- This hazard is not credible. (4 24 88)

LRB-P-Q-578 - Crew access provisions can cause or be jeopardized by unsafe or unhygienic working conditions during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-579 - Crew access provisions can cause or be jeopardized by unsafe or unhygienic working conditions during inspection and test of the LRB and subsystems. -- This hazard is analyzed as G-531, I-579 and K-579. (4 24 88)

LRB-P-Q-580 - Crew access provisions can cause or be jeopardized by unsafe or unhygienic working conditions during proof test of pressure vessels and structure. -- This hazard is analyzed as G-532. (4 24 88)

LRB-P-Q-581 - Crew access provisions can cause or be jeopardized by unsafe or unhygienic working conditions during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-582 - Crew access provisions can cause or be jeopardized by unsafe or unhygienic working conditions during test firing of engines and/or the completed booster. -- This hazard is analyzed as F-559. (4 24 88)

LRB-P-Q-583 - Crew access provisions can cause or be jeopardized by unsafe or unhygienic working conditions during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as F-559. (4 24 88)

LRB-P-Q-584 - Crew access provisions can cause or be jeopardized by unsafe or unhygienic working conditions during preparation for shipment of the booster and ship loose hardware. -- This hazard is analyzed as Q-537. (4 24 88)

LRB-P-Q-585 - Crew access provisions can cause or be jeopardized by unsafe or unhygienic working conditions during transportation from manufacture to launch site or after recovery. -- This hazard is analyzed as Q-537. (4 24 88)

LRB-P-Q-586 - Crew access provisions can cause or be jeopardized by unsafe or unhygienic working conditions during storage, including storage of major components. -- This hazard is analyzed as Q-537. (4 24 88)

LRB-P-Q-587 - Crew access provisions can cause or be jeopardized by unsafe or unhygienic working conditions during preflight checkout prior to stacking. -- This hazard is analyzed as G-531. (4 24 88)

LRB-P-Q-588 - Crew access provisions can cause or be jeopardized by unsafe or unhygienic working conditions during vehicle stacking, including ancillary test activities. -- This hazard is analyzed as F-588. (4 24 88)

LRB-P-Q-589 - Crew access provisions can cause or be jeopardized by unsafe or unhygienic working conditions during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-590 - Crew access provisions can cause or be jeopardized by unsafe or unhygienic working conditions during propellant loading for test or flight. -- This hazard is analyzed as K-579, I-579 and F-559. (4 24 88)

LRB-P-Q-591 - Crew access provisions can cause or be jeopardized by unsafe or unhygienic working conditions during countdown to liftoff or abort. -- This hazard is analyzed as F-559, I-579 and K-579. (4 24 88)

LRB-P-Q-592 - Crew access provisions can cause or be jeopardized by unsafe or unhygienic working conditions during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as C-590 and C-592. (4 24 88)

LRB-P-Q-599 - Crew access provisions can cause or be jeopardized by unsafe or unhygienic working conditions during recovery activities, including towing, and retrieval of recoverables. -- This hazard is analyzed as D-599. (4 24 88)

LRB-P-Q-600 - Crew access provisions can cause or be jeopardized by unsafe or unhygienic working conditions during refurbishment of reusable components. -- This hazard is analyzed as G-531 and K-579. (4 24 88)

LRB-P-Q-724 - Crew access provisions can cause or be jeopardized by moisture or precipitation during proof test of pressure vessels and structure. -- If tanks do not rupture, there does not appear to be any hazard from water (used as pressurant) to testing personnel. If a rupture occurs, this hazard is analyzed as G-532. (4 24 88)

LRB-P-Q-726 - Crew access provisions can cause or be jeopardized by moisture or precipitation during test firing of engines and/or the completed booster. -- Crew access is not likely to be required during test firing. (4 24 88)

LRB-P-Q-727 - Crew access provisions can cause or be jeopardized by moisture or precipitation during flight readiness firing (FRF) of the STS vehicle. -- Crew access is not likely to be required during FRF. (4 24 88)

LRB-P-Q-729 - Crew access provisions can cause or be jeopardized by moisture or precipitation during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-730 - Crew access provisions can cause or be jeopardized by moisture or precipitation during storage, including storage of major components. -- This hazard is not credible. (4 24 88)

LRB-P-Q-731 - Crew access provisions can cause or be jeopardized by moisture or precipitation during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-732 - Crew access provisions can cause or be jeopardized by moisture or precipitation during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (4 24 88)

LRB-P-Q-733 - Crew access provisions can cause or be jeopardized by moisture or precipitation during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-734 - Crew access provisions can cause or be jeopardized by moisture or precipitation during propellant loading for test or flight. -- It is assumed that operation and maintenance instructions will adequately prepare the launch inspection crew to deal with hazards relating to icing of components or launch facilities. (4 24 88)

LRB-P-Q-735 - Crew access provisions can cause or be jeopardized by moisture or precipitation during countdown to liftoff or abort. -- See the comment for Q-734. (4 24 88)

LRB-P-Q-736 - Crew access provisions can cause or be jeopardized by moisture or precipitation during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-743 - Crew access provisions can cause or be jeopardized by moisture or precipitation during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-744 - Crew access provisions can cause or be jeopardized by moisture or precipitation during refurbishment of reusable components. -- This hazard is not credible. (4 24 88)

LRB-P-Q-746 - Crew access provisions can cause or be jeopardized by electrical system malfunction during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-748 - Crew access provisions can cause or be jeopardized by electrical system malfunction during proof test of pressure vessels and structure. -- This hazard is analyzed as G-748 with respect to the LRB as a whole. (4 24 88)

LRB-P-Q-749 - Crew access provisions can cause or be jeopardized by electrical system malfunction during acceptance test and checkout prior to delivery to the Government. -- This hazard is analyzed as E-747. (4 24 88)

LRB-P-Q-750 - Crew access provisions can cause or be jeopardized by electrical system malfunction during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-751 - Crew access provisions can cause or be jeopardized by electrical system malfunction during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-752 - Crew access provisions can cause or be jeopardized by electrical system malfunction during preparation for shipment of the booster and ship loose hardware. -- This hazard is not credible. (4 24 88)

LRB-P-Q-753 - Crew access provisions can cause or be jeopardized by electrical system malfunction during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (4 24 88)

LRB-P-Q-754 - Crew access provisions can cause or be jeopardized by electrical system malfunction during storage, including storage of major components. -- This hazard is analyzed as Q-748. (4 24 88)

LRB-P-Q-755 - Crew access provisions can cause or be jeopardized by electrical system malfunction during preflight checkout prior to stacking. -- This hazard is analyzed as Q-748. (4 24 88)

LRB-P-Q-756 - Crew access provisions can cause or be jeopardized by electrical system malfunction during vehicle stacking, including ancillary test activities. -- This hazard is analyzed as Q-748. (4 24 88)

LRB-P-Q-757 - Crew access provisions can cause or be jeopardized by electrical system malfunction during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-758 - Crew access provisions can cause or be jeopardized by electrical system malfunction during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-759 - Crew access provisions can cause or be jeopardized by electrical system malfunction during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-760 - Crew access provisions can cause or be jeopardized by electrical system malfunction during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-767 - Crew access provisions can cause or be jeopardized by electrical system malfunction during recovery activities, including towing, and retrieval of

recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-768 - Crew access provisions can cause or be jeopardized by electrical system malfunction during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-843 - Crew access provisions can cause or be jeopardized by leaks during inspection and test of the LRB and subsystems. -- This hazard is analyzed as Q-537. (4 24 88)

LRB-P-Q-844 - Crew access provisions can cause or be jeopardized by leaks during proof test of pressure vessels and structure. -- See hazard analysis for G-532. (4 24 88)

LRB-P-Q-845 - Crew access provisions can cause or be jeopardized by leaks during acceptance test and checkout prior to delivery to the Government. -- See the hazard analysis for G-532. (4 24 88)

LRB-P-Q-846 - Crew access provisions can cause or be jeopardized by leaks during test firing of engines and/or the completed booster. -- Crew access will not likely be required during test firing or FRF. (4 24 88)

LRB-P-Q-847 - Crew access provisions can cause or be jeopardized by leaks during flight readiness firing (FRF) of the STS vehicle. -- (4 24 88)

LRB-P-Q-849 - Crew access provisions can cause or be jeopardized by leaks during transportation from manufacture to launch site or after recovery. -- This hazard is analyzed as Q-537. (4 24 88)

LRB-P-Q-850 - Crew access provisions can cause or be jeopardized by leaks during storage, including storage of major components. -- This hazard is analyzed as Q-537. (4 24 88)

LRB-P-Q-851 - Crew access provisions can cause or be jeopardized by leaks during preflight checkout prior to stacking. -- This hazard is analyzed as Q-537. (4 24 88)

LRB-P-Q-852 - Crew access provisions can cause or be jeopardized by leaks during vehicle stacking, including ancillary test activities. -- This hazard is analyzed as Q-537. (4 24 88)

LRB-P-Q-853 - Crew access provisions can cause or be jeopardized by leaks during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-854 - Crew access provisions can cause or be jeopardized by leaks during

propellant loading for test or flight. -- This hazard is analyzed as K-579. (4 24 88)

LRB-P-Q-855 - Crew access provisions can cause or be jeopardized by leaks during countdown to liftoff or abort. -- This hazard is analyzed as K-579. (4 24 88)

LRB-P-Q-856 - Crew access provisions can cause or be jeopardized by leaks during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as K-579. (4 24 88)

LRB-P-Q-863 - Crew access provisions can cause or be jeopardized by leaks during recovery activities, including towing, and retrieval of recoverables. -- This hazard is analyzed as K-579. (4 24 88)

LRB-P-Q-864 - Crew access provisions can cause or be jeopardized by leaks during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-870 - Crew access provisions can cause or be jeopardized by propellant characteristics and products during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-871 - Crew access provisions can cause or be jeopardized by propellant characteristics and products during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-873 - Crew access provisions can cause or be jeopardized by propellant characteristics and products during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (4 24 88)

LRB-P-Q-874 - Crew access provisions can cause or be jeopardized by propellant characteristics and products during storage, including storage of major components. -- This hazard is not credible. (4 24 88)

LRB-P-Q-877 - Crew access provisions can cause or be jeopardized by propellant characteristics and products during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 24 88)

LRB-P-Q-878 - Crew access provisions can cause or be jeopardized by propellant characteristics and products during propellant loading for test or flight. -- This hazard is analyzed as K-579. (4 24 88)

LRB-P-Q-879 - Crew access provisions can cause or be jeopardized by propellant characteristics and products during countdown to liftoff or abort. -- This hazard is analyzed as K-579. (4 24 88)

LRB-P-Q-880 - Crew access provisions can cause or be jeopardized by propellant

characteristics and products during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as K-579. (4 24 88)

LRB-P-Q-887 - Crew access provisions can cause or be jeopardized by propellant characteristics and products during recovery activities, including towing, and retrieval of recoverables. -- This hazard is analyzed as K-579. (4 24 88)

LRB-P-Q-888 - Crew access provisions can cause or be jeopardized by propellant characteristics and products during refurbishment of reusable components. -- This hazard is analyzed as K-579. (4 24 88)

LRB-P-Q-894 - Crew access provisions can cause or be jeopardized by lightning or electromagnetic discharge during test firing of engines and/or the completed booster. -- In this and the hazard titles which follow, it is assumed that crews will not be required to work on or within the LRB when there is danger of lightning, or else that they will be adequately protected. Electrostatic discharge or electromagnetic discharge does not appear to be a problem insofar as precautions will already have been taken to avoid generation of static or induced currents to prevent ignition of hydrogen. Hazards to crew access or due to crew access with respect to electrical discharge therefore appear to be remote. Any hazard which arises due to some unique characteristic of the design of the LRB cannot be adequately analyzed at this stage of design maturity. (4 24 88)

LRB-P-Q-895 - Crew access provisions can cause or be jeopardized by lightning or electromagnetic discharge during flight readiness firing (FRF) of the STS vehicle. -- See comments for Q-894. (4 24 88)

LRB-P-Q-897 - Crew access provisions can cause or be jeopardized by lightning or electromagnetic discharge during transportation from manufacture to launch site or after recovery. -- See comments for Q-894. (4 24 88)

LRB-P-Q-898 - Crew access provisions can cause or be jeopardized by lightning or electromagnetic discharge during storage, including storage of major components. -- See comments for Q-894. (4 24 88)

LRB-P-Q-901 - Crew access provisions can cause or be jeopardized by lightning or electromagnetic discharge during rollout from the VAB and preloading preparation. -- See comments for Q-894. (4 24 88)

LRB-P-Q-902 - Crew access provisions can cause or be jeopardized by lightning or electromagnetic discharge during propellant loading for test or flight. -- See comments for Q-894. (4 24 88)

LRB-P-Q-903 - Crew access provisions can cause or be jeopardized by lightning or electromagnetic discharge during countdown to liftoff or abort. -- See comments for Q-894. (4 24 88)

LRB-P-Q-904 - Crew access provisions can cause or be jeopardized by lightning or electromagnetic discharge during launch abort activities, including mission postponement (scrub). -- See comments for Q-894. (4 24 88)

LRB-P-Q-911 - Crew access provisions can cause or be jeopardized by lightning or electromagnetic discharge during recovery activities, including towing, and retrieval of recoverables. -- See comments for Q-894. (4 24 88)

LRB-P-Q-913 - Crew access provisions can cause or be jeopardized by faulty documentation during component or material purchase, including acquisition of GFP. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-914 - Crew access provisions can cause or be jeopardized by faulty documentation during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-915 - Crew access provisions can cause or be jeopardized by faulty documentation during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-916 - Crew access provisions can cause or be jeopardized by faulty documentation during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-917 - Crew access provisions can cause or be jeopardized by faulty documentation during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-918 - Crew access provisions can cause or be jeopardized by faulty documentation during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-919 - Crew access provisions can cause or be jeopardized by faulty documentation during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-920 - Crew access provisions can cause or be jeopardized by faulty documentation during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-921 - Crew access provisions can cause or be jeopardized by faulty documentation during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-922 - Crew access provisions can cause or be jeopardized by faulty documentation during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-923 - Crew access provisions can cause or be jeopardized by faulty documentation during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-924 - Crew access provisions can cause or be jeopardized by faulty documentation during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-925 - Crew access provisions can cause or be jeopardized by faulty documentation during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-926 - Crew access provisions can cause or be jeopardized by faulty documentation during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-927 - Crew access provisions can cause or be jeopardized by faulty documentation during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-928 - Crew access provisions can cause or be jeopardized by faulty documentation during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-935 - Crew access provisions can cause or be jeopardized by faulty documentation during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-936 - Crew access provisions can cause or be jeopardized by faulty documentation during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-962 - Crew access provisions can cause or be jeopardized by computer system malfunction during manufacture and fabrication of subsystems and components. -- Crew access provisions are not likely to be affected by computer malfunction during any life cycle phase. (4 24 88)

LRB-P-Q-963 - Crew access provisions can cause or be jeopardized by computer system malfunction during inspection and test of the LRB and subsystems. -- Crew access provisions are not likely to be affected by computer malfunction during any life cycle phase. (4 24 88)

LRB-P-Q-964 - Crew access provisions can cause or be jeopardized by computer system malfunction during proof test of pressure vessels and structure. -- Crew access provisions are not likely to be affected by computer malfunction during any life cycle phase. (4 24 88)

LRB-P-Q-965 - Crew access provisions can cause or be jeopardized by computer system malfunction during acceptance test and checkout prior to delivery to the Government. -- Crew access provisions are not likely to be affected by computer malfunction during any life cycle phase. (4 24 88)

LRB-P-Q-966 - Crew access provisions can cause or be jeopardized by computer system malfunction during test firing of engines and/or the completed booster. -- Crew access provisions are not likely to be affected by computer malfunction during any life cycle phase. (4 24 88)

LRB-P-Q-967 - Crew access provisions can cause or be jeopardized by computer system malfunction during flight readiness firing (FRF) of the STS vehicle. -- Crew access provisions are not likely to be affected by computer malfunction during any life cycle phase. (4 24 88)

LRB-P-Q-969 - Crew access provisions can cause or be jeopardized by computer system malfunction during transportation from manufacture to launch site or after recovery. -- Crew access provisions are not likely to be affected by computer malfunction during any life cycle phase. (4 24 88)

LRB-P-Q-970 - Crew access provisions can cause or be jeopardized by computer system malfunction during storage, including storage of major components. -- Crew access provisions are not likely to be affected by computer malfunction during any life cycle phase. (4 24 88)

LRB-P-Q-971 - Crew access provisions can cause or be jeopardized by computer system malfunction during preflight checkout prior to stacking. -- Crew access provisions are not likely to be affected by computer malfunction during any life cycle phase. (4 24 88)

LRB-P-Q-972 - Crew access provisions can cause or be jeopardized by computer system malfunction during vehicle stacking, including ancillary test activities. -- Crew access provisions are not likely to be affected by computer malfunction during any life cycle phase. (4 24 88)

LRB-P-Q-973 - Crew access provisions can cause or be jeopardized by computer system malfunction during rollout from the VAB and preloading preparation. -- Crew access provisions are not likely to be affected by computer malfunction during any life cycle phase. (4 24 88)

LRB-P-Q-974 - Crew access provisions can cause or be jeopardized by computer

system malfunction during propellant loading for test or flight. -- Crew access provisions are not likely to be affected by computer malfunction during any life cycle phase. (4 24 88)

LRB-P-Q-975 - Crew access provisions can cause or be jeopardized by computer system malfunction during countdown to liftoff or abort. -- Crew access provisions are not likely to be affected by computer malfunction during any life cycle phase. (4 24 88)

LRB-P-Q-976 - Crew access provisions can cause or be jeopardized by computer system malfunction during launch abort activities, including mission postponement (scrub). -- Crew access provisions are not likely to be affected by computer malfunction during any life cycle phase. (4 24 88)

LRB-P-Q-983 - Crew access provisions can cause or be jeopardized by computer system malfunction during recovery activities, including towing, and retrieval of recoverables. -- Crew access provisions are not likely to be affected by computer malfunction during any life cycle phase. (4 24 88)

LRB-P-Q-984 - Crew access provisions can cause or be jeopardized by computer system malfunction during refurbishment of reusable components. -- Crew access provisions are not likely to be affected by computer malfunction during any life cycle phase. (4 24 88)

LRB-P-Q-986 - Crew access provisions can cause or be jeopardized by operator error during manufacture and fabrication of subsystems and components. -- The hazard of installing manholes and access doors in the wrong location is analyzed as P-986. (4 24 88)

LRB-P-Q-987 - Crew access provisions can cause or be jeopardized by operator error during inspection and test of the LRB and subsystems. -- The hazard of installing a manhole cover in the wrong location is analyzed as P-986. (4 24 88)

LRB-P-Q-988 - Crew access provisions can cause or be jeopardized by operator error during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-989 - Crew access provisions can cause or be jeopardized by operator error during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-990 - Crew access provisions can cause or be jeopardized by operator error during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-991 - Crew access provisions can cause or be jeopardized by operator

error during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-992 - Crew access provisions can cause or be jeopardized by operator error during preparation for shipment of the booster and ship loose hardware. -- The hazard of installing a manhole cover in the wrong location is analyzed as P-986. (4 24 88)

LRB-P-Q-993 - Crew access provisions can cause or be jeopardized by operator error during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-994 - Crew access provisions can cause or be jeopardized by operator error during storage, including storage of major components. -- This hazard is not credible. (4 24 88)

LRB-P-Q-995 - Crew access provisions can cause or be jeopardized by operator error during preflight checkout prior to stacking. -- The hazard of installing a manhole cover in the wrong location is analyzed as P-986. Hazards relating to work platforms are analyzed as G-531. (4 24 88)

LRB-P-Q-996 - Crew access provisions can cause or be jeopardized by operator error during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-997 - Crew access provisions can cause or be jeopardized by operator error during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-998 - Crew access provisions can cause or be jeopardized by operator error during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-999 - Crew access provisions can cause or be jeopardized by operator error during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-1000 - Crew access provisions can cause or be jeopardized by operator error during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-1007 - Crew access provisions can cause or be jeopardized by operator error during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-1008 - Crew access provisions can cause or be jeopardized by operator

error during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-1034 - Crew access provisions can cause or be jeopardized by emergencies during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-1035 - Crew access provisions can cause or be jeopardized by emergencies during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-1036 - Crew access provisions can cause or be jeopardized by emergencies during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-1037 - Crew access provisions can cause or be jeopardized by emergencies during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (4 24 88)

LRB-P-Q-1038 - Crew access provisions can cause or be jeopardized by emergencies during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-1039 - Crew access provisions can cause or be jeopardized by emergencies during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-1040 - Crew access provisions can cause or be jeopardized by emergencies during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-1041 - Crew access provisions can cause or be jeopardized by emergencies during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-1042 - Crew access provisions can cause or be jeopardized by emergencies during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-1043 - Crew access provisions can cause or be jeopardized by emergencies during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-1044 - Crew access provisions can cause or be jeopardized by emergencies during vehicle stacking, including ancillary test activities. -- At the

current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-1045 - Crew access provisions can cause or be jeopardized by emergencies during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-1047 - Crew access provisions can cause or be jeopardized by emergencies during countdown to liftoff or abort. -- This hazard is analyzed as Q-1046. (4 24 88)

LRB-P-Q-1048 - Crew access provisions can cause or be jeopardized by emergencies during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as Q-1046. (4 24 88)

LRB-P-Q-1055 - Crew access provisions can cause or be jeopardized by emergencies during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

LRB-P-Q-1056 - Crew access provisions can cause or be jeopardized by emergencies during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 24 88)

THESE HAZARDS WERE CONSIDERED BY THE ANALYST BUT WERE NOT FURTHER ANALYZED FOR THE REASONS GIVEN

LRB-P-R-530 - The range safety system can cause or be jeopardized by hazardous environments during manufacture and fabrication of subsystems and components. -- This hazard will have to be addressed by the RSS manufacturer. It is assumed that the RSS components will be GFP. (4 25 88)

LRB-P-R-533 - The range safety system can cause or be jeopardized by hazardous environments during acceptance test and checkout prior to delivery to the Government. -- This hazard is analyzed as R-531. (4 25 88)

LRB-P-R-535 - The range safety system can cause or be jeopardized by hazardous environments during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as R-534. (4 25 88)

LRB-P-R-536 - The range safety system can cause or be jeopardized by hazardous environments during preparation for shipment of the booster and ship loose hardware. -- It is assumed that explosive components will be shipped in accordance with all applicable ICC and DOT requirements and with appropriate safeguards to preclude hazards to transportation workers, drivers or the public. (4 25 88)

LRB-P-R-537 - The range safety system can cause or be jeopardized by hazardous environments during transportation from manufacture to launch site or after recovery. -- See the comment for R-536. (4 25 88)

LRB-P-R-538 - The range safety system can cause or be jeopardized by hazardous environments during storage, including storage of major components. -- Storage of RSS components is well established and does not appear at this time to pose a serious hazard. (4 25 88)

LRB-P-R-539 - The range safety system can cause or be jeopardized by hazardous environments during preflight checkout prior to stacking. -- This hazard is analyzed as R-531. (4 25 88)

LRB-P-R-540 - The range safety system can cause or be jeopardized by hazardous environments during vehicle stacking, including ancillary test activities. -- This hazard is analyzed as R-531. (4 25 88)

LRB-P-R-541 - The range safety system can cause or be jeopardized by hazardous environments during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 25 88)

LRB-P-R-544 - The range safety system can cause or be jeopardized by hazardous environments during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as R-543. (4 25 88)

LRB-P-R-546 - The range safety system can cause or be jeopardized by hazardous environments during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is analyzed as R-545. (4 25 88)

LRB-P-R-547 - The range safety system can cause or be jeopardized by hazardous environments during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 25 88)

LRB-P-R-548 - The range safety system can cause or be jeopardized by hazardous environments during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (4 25 88)

LRB-P-R-549 - The range safety system can cause or be jeopardized by hazardous environments during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 25 88)

LRB-P-R-550 - The range safety system can cause or be jeopardized by hazardous environments during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 25 88)

LRB-P-R-551 - The range safety system can cause or be jeopardized by hazardous environments during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 25 88)

LRB-P-R-552 - The range safety system can cause or be jeopardized by hazardous environments during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 25 88)

LRB-P-R-578 - The range safety system can cause or be jeopardized by unsafe or unhygienic working conditions during manufacture and fabrication of subsystems and components. -- It is assumed that the RSS components will be GFP. Industrial safety and hygiene will be the responsibility of the component manufacturer. (4 25 88)

LRB-P-R-579 - The range safety system can cause or be jeopardized by unsafe or unhygienic working conditions during inspection and test of the LRB and subsystems. -- This hazard is analyzed as R-531. (4 25 88)

LRB-P-R-581 - The range safety system can cause or be jeopardized by unsafe or unhygienic working conditions during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 25 88)

LRB-P-R-582 - The range safety system can cause or be jeopardized by unsafe or

unhygienic working conditions during test firing of engines and/or the completed booster. -- This hazard is analyzed as R-534. (4 25 88)

LRB-P-R-583 - The range safety system can cause or be jeopardized by unsafe or unhygienic working conditions during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as R-534. (4 25 88)

LRB-P-R-584 - The range safety system can cause or be jeopardized by unsafe or unhygienic working conditions during preparation for shipment of the booster and ship loose hardware. -- It is assumed that explosive components will be packaged for shipment to conform with all ICC and DOT shipping requirements and appropriate concern for worker and transportation safety. (4 25 88)

LRB-P-R-585 - The range safety system can cause or be jeopardized by unsafe or unhygienic working conditions during transportation from manufacture to launch site or after recovery. -- See comment for R-584. (4 25 88)

LRB-P-R-586 - The range safety system can cause or be jeopardized by unsafe or unhygienic working conditions during storage, including storage of major components. -- Range safety explosives will probably be stored separately from the LRB vehicle. It is assumed that proper storage procedures and conditions, safe distance criteria, and other requirements for handling explosives will be observed. (4 25 88)

LRB-P-R-587 - The range safety system can cause or be jeopardized by unsafe or unhygienic working conditions during preflight checkout prior to stacking. -- It is anticipated that the RSS explosive components will be installed in the LRB vehicle in approximately the same sequence and location as is now done for the SRB. Therefore, hazards from this cause appear not to be substantially different from those now successfully dealt with. (4 25 88)

LRB-P-R-588 - The range safety system can cause or be jeopardized by unsafe or unhygienic working conditions during vehicle stacking, including ancillary test activities. -- See the comment for R-587. (4 25 88)

LRB-P-R-589 - The range safety system can cause or be jeopardized by unsafe or unhygienic working conditions during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 25 88)

LRB-P-R-590 - The range safety system can cause or be jeopardized by unsafe or unhygienic working conditions during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 25 88)

LRB-P-R-591 - The range safety system can cause or be jeopardized by unsafe or unhygienic working conditions during countdown to liftoff or abort. -- This hazard is

analyzed as R-543. (4 25 88)

LRB-P-R-592 - The range safety system can cause or be jeopardized by unsafe or unhygienic working conditions during launch abort activities, including mission postponement (scrub). -- If the recommendations in the analysis of R-543 are taken, the RSS will not be armed if the launch is aborted. This would enhance flight crew and launch crew safety. (4 25 88)

LRB-P-R-599 - The range safety system can cause or be jeopardized by unsafe or unhygienic working conditions during recovery activities, including towing, and retrieval of recoverables. -- This hazard is analyzed as R-598. (4 25 88)

LRB-P-R-600 - The range safety system can cause or be jeopardized by unsafe or unhygienic working conditions during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 25 88)

LRB-P-R-678 - The range safety system can cause or be jeopardized by heat sources during test firing of engines and/or the completed booster. -- This hazard is analyzed as R-534. (4 25 88)

LRB-P-R-679 - The range safety system can cause or be jeopardized by heat sources during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as R-534. (4 25 88)

LRB-P-R-681 - The range safety system can cause or be jeopardized by heat sources during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 25 88)

LRB-P-R-682 - The range safety system can cause or be jeopardized by heat sources during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (4 25 88)

LRB-P-R-685 - The range safety system can cause or be jeopardized by heat sources during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 25 88)

LRB-P-R-686 - The range safety system can cause or be jeopardized by heat sources during propellant loading for test or flight. -- This hazard is analyzed as R-542. (4 25 88)

LRB-P-R-687 - The range safety system can cause or be jeopardized by heat sources during countdown to liftoff or abort. -- This hazard is analyzed as R-543. (4 25 88)

LRB-P-R-688 - The range safety system can cause or be jeopardized by heat sources during launch abort activities, including mission postponement (scrub). -- At

the current state of maturity, this hazard cannot be evaluated. (4 25 88)

LRB-P-R-689 - The range safety system can cause or be jeopardized by heat sources during nominal flight from liftoff to LRB burnout. -- This hazard is analyzed as R-545. (4 25 88)

LRB-P-R-690 - The range safety system can cause or be jeopardized by heat sources during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 25 88)

LRB-P-R-691 - The range safety system can cause or be jeopardized by heat sources during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 25 88)

LRB-P-R-692 - The range safety system can cause or be jeopardized by heat sources during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (4 25 88)

LRB-P-R-699 - The range safety system can cause or be jeopardized by radiation or sunlight during inspection and test of the LRB and subsystems. -- It is assumed that sufficient safeguards will be taken to avoid the possibility of firing the RSS due to electromagnetic radiation reception, and that operational codes will not be transmitted during testing. (4 27 88)

LRB-P-R-701 - The range safety system can cause or be jeopardized by radiation or sunlight during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (4 27 88)

LRB-P-R-702 - The range safety system can cause or be jeopardized by radiation or sunlight during test firing of engines and/or the completed booster. -- It is not likely that the RSS will be installed during testing. See R-534. (4 27 88)

LRB-P-R-703 - The range safety system can cause or be jeopardized by radiation or sunlight during flight readiness firing (FRF) of the STS vehicle. -- There does not appear to be anything about FRF which would make the RSS more sensitive to damage by radiation than at any other time. (4 27 88)

LRB-P-R-705 - The range safety system can cause or be jeopardized by radiation or sunlight during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (4 27 88)

LRB-P-R-708 - The range safety system can cause or be jeopardized by radiation or sunlight during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (4 27 88)

LRB-P-R-709 - The range safety system can cause or be jeopardized by radiation or

sunlight during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 27 88)

LRB-P-R-710 - The range safety system can cause or be jeopardized by radiation or sunlight during propellant loading for test or flight. -- Prior to insertion of the operational code cards, the RSS is presumed not to be capable of being activated. (4 27 88)

LRB-P-R-711 - The range safety system can cause or be jeopardized by radiation or sunlight during countdown to liftoff or abort. -- See comments for R-543. (4 27 88)

LRB-P-R-712 - The range safety system can cause or be jeopardized by radiation or sunlight during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 27 88)

LRB-P-R-714 - The range safety system can cause or be jeopardized by radiation or sunlight during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is analyzed as R-713. (4 27 88)

LRB-P-R-715 - The range safety system can cause or be jeopardized by radiation or sunlight during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 27 88)

LRB-P-R-716 - The range safety system can cause or be jeopardized by radiation or sunlight during descent from separation to ocean impact. -- This hazard is not credible. (4 27 88)

LRB-P-R-717 - The range safety system can cause or be jeopardized by radiation or sunlight during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 27 88)

LRB-P-R-718 - The range safety system can cause or be jeopardized by radiation or sunlight during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 27 88)

LRB-P-R-719 - The range safety system can cause or be jeopardized by radiation or sunlight during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (4 27 88)

LRB-P-R-720 - The range safety system can cause or be jeopardized by radiation or sunlight during refurbishment of reusable components. -- This hazard is not credible. (4 27 88)

LRB-P-R-746 - The range safety system can cause or be jeopardized by electrical system malfunction during manufacture and fabrication of subsystems and components. -- It is assumed that the RSS components will be GFP. This hazard

would be analyzed by the component manufacturer. (4 27 88)

LRB-P-R-747 - The range safety system can cause or be jeopardized by electrical system malfunction during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 27 88)

LRB-P-R-749 - The range safety system can cause or be jeopardized by electrical system malfunction during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 27 88)

LRB-P-R-750 - The range safety system can cause or be jeopardized by electrical system malfunction during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 27 88)

LRB-P-R-752 - The range safety system can cause or be jeopardized by electrical system malfunction during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 27 88)

LRB-P-R-753 - The range safety system can cause or be jeopardized by electrical system malfunction during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 27 88)

LRB-P-R-754 - The range safety system can cause or be jeopardized by electrical system malfunction during storage, including storage of major components. -- All RSS electronics are likely to be powered down during storage. It is not likely that vehicles will be stored with electrical components having a limitation on storage life. (4 27 88)

LRB-P-R-755 - The range safety system can cause or be jeopardized by electrical system malfunction during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 27 88)

LRB-P-R-756 - The range safety system can cause or be jeopardized by electrical system malfunction during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 27 88)

LRB-P-R-757 - The range safety system can cause or be jeopardized by electrical system malfunction during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 27 88)

LRB-P-R-758 - The range safety system can cause or be jeopardized by electrical system malfunction during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 27 88)

LRB-P-R-759 - The range safety system can cause or be jeopardized by electrical system malfunction during countdown to liftoff or abort. -- It is assumed that premature rotation or failure of the S&A device to rotate would be cause for a launch abort. However, see comments for R-543. (4 27 88)

LRB-P-R-760 - The range safety system can cause or be jeopardized by electrical system malfunction during launch abort activities, including mission postponement (scrub). -- See comments for R-759. (4 27 88)

LRB-P-R-761 - The range safety system can cause or be jeopardized by electrical system malfunction during nominal flight from liftoff to LRB burnout. -- Inadvertent ignition of the RSS by electronic failure is an obvious hazard, but this appears to be a FMEA item. (4 27 88)

LRB-P-R-762 - The range safety system can cause or be jeopardized by electrical system malfunction during intact abort, including RTLS, TAL, AOA and ATO. -- See comment for R-761. (4 27 88)

LRB-P-R-763 - The range safety system can cause or be jeopardized by electrical system malfunction during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 27 88)

LRB-P-R-764 - The range safety system can cause or be jeopardized by electrical system malfunction during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (4 27 88)

LRB-P-R-765 - The range safety system can cause or be jeopardized by electrical system malfunction during splashdown events occuring at impact (disposable for expendables). -- This hazard is analyzed as R-598. (4 27 88)

LRB-P-R-766 - The range safety system can cause or be jeopardized by electrical system malfunction during floatation (of recoverable boosters) until recovery. -- This hazard is analyzed as R-598. (4 27 88)

LRB-P-R-767 - The range safety system can cause or be jeopardized by electrical system malfunction during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 27 88)

LRB-P-R-768 - The range safety system can cause or be jeopardized by electrical system malfunction during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 27 88)

LRB-P-R-798 - The range safety system can cause or be jeopardized by vibration, acoustic loads or shock during test firing of engines and/or the completed booster. -- This hazard is analyzed as R-534. (4 27 88)

LRB-P-R-799 - The range safety system can cause or be jeopardized by vibration, acoustic loads or shock during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as R-534. (4 27 88)

LRB-P-R-801 - The range safety system can cause or be jeopardized by vibration, acoustic loads or shock during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-808 - The range safety system can cause or be jeopardized by vibration, acoustic loads or shock during launch abort activities, including mission postponement (scrub). -- Heat and acoustic loading during a launch abort will resemble the environment of a test firing, but of shorter duration. Therefore, this hazard is similar, but of less severity than R-534. (4 28 88)

LRB-P-R-810 - The range safety system can cause or be jeopardized by vibration, acoustic loads or shock during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-811 - The range safety system can cause or be jeopardized by vibration, acoustic loads or shock during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-812 - The range safety system can cause or be jeopardized by vibration, acoustic loads or shock during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-813 - The range safety system can cause or be jeopardized by vibration, acoustic loads or shock during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-815 - The range safety system can cause or be jeopardized by vibration, acoustic loads or shock during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-894 - The range safety system can cause or be jeopardized by lightning or electromagnetic discharge during test firing of engines and/or the completed booster. -- The analysis for R-534 recommends not installing the RSS explosive components until all static firing tests have been completed. If this recommendation is adopted, this hazard becomes the same as that analyzed as E-894. (4 28 88)

LRB-P-R-895 - The range safety system can cause or be jeopardized by lightning or electromagnetic discharge during flight readiness firing (FRF) of the STS vehicle. -- See comments for R-894. (4 28 88)

LRB-P-R-897 - The range safety system can cause or be jeopardized by lightning or electromagnetic discharge during transportation from manufacture to launch site or after recovery. -- This hazard is analyzed as E-895 for electrical components. (4 28 88)

LRB-P-R-898 - The range safety system can cause or be jeopardized by lightning or electromagnetic discharge during storage, including storage of major components. -- This hazard is not credible. (4 28 88)

LRB-P-R-901 - The range safety system can cause or be jeopardized by lightning or electromagnetic discharge during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-902 - The range safety system can cause or be jeopardized by lightning or electromagnetic discharge during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-903 - The range safety system can cause or be jeopardized by lightning or electromagnetic discharge during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-904 - The range safety system can cause or be jeopardized by lightning or electromagnetic discharge during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-905 - The range safety system can cause or be jeopardized by lightning or electromagnetic discharge during nominal flight from liftoff to LRB burnout. -- This hazard is analyzed as E-895 for electrical components. (4 28 88)

LRB-P-R-906 - The range safety system can cause or be jeopardized by lightning or electromagnetic discharge during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is analyzed as E-895 for electrical components. (4 28 88)

LRB-P-R-907 - The range safety system can cause or be jeopardized by lightning or electromagnetic discharge during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 28 88)

LRB-P-R-908 - The range safety system can cause or be jeopardized by lightning or electromagnetic discharge during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-909 - The range safety system can cause or be jeopardized by lightning or electromagnetic discharge during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-910 - The range safety system can cause or be jeopardized by lightning or electromagnetic discharge during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-911 - The range safety system can cause or be jeopardized by lightning or electromagnetic discharge during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-962 - The range safety system can cause or be jeopardized by computer system malfunction during manufacture and fabrication of subsystems and components. -- This hazard appears to be related to computer aided manufacturing, which cannot be adequately assessed at this time. (4 28 88)

LRB-P-R-963 - The range safety system can cause or be jeopardized by computer system malfunction during inspection and test of the LRB and subsystems. -- This hazard is analyzed as E-963 for electrical components. (4 28 88)

LRB-P-R-965 - The range safety system can cause or be jeopardized by computer system malfunction during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (4 28 88)

LRB-P-R-966 - The range safety system can cause or be jeopardized by computer system malfunction during test firing of engines and/or the completed booster. -- This hazard is analyzed as E-967 for electrical components. (4 28 88)

LRB-P-R-967 - The range safety system can cause or be jeopardized by computer system malfunction during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as E-967 for electrical components. (4 28 88)

LRB-P-R-969 - The range safety system can cause or be jeopardized by computer system malfunction during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (4 28 88)

LRB-P-R-970 - The range safety system can cause or be jeopardized by computer system malfunction during storage, including storage of major components. -- This hazard is not credible. (4 28 88)

LRB-P-R-971 - The range safety system can cause or be jeopardized by computer system malfunction during preflight checkout prior to stacking. -- This hazard is not credible. (4 28 88)

LRB-P-R-972 - The range safety system can cause or be jeopardized by computer system malfunction during vehicle stacking, including ancillary test activities. -- This hazard is analyzed as E-963 for electrical components. (4 28 88)

LRB-P-R-973 - The range safety system can cause or be jeopardized by computer system malfunction during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 28 88)

LRB-P-R-974 - The range safety system can cause or be jeopardized by computer system malfunction during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-976 - The range safety system can cause or be jeopardized by computer system malfunction during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-977 - The range safety system can cause or be jeopardized by computer system malfunction during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (4 28 88)

LRB-P-R-978 - The range safety system can cause or be jeopardized by computer system malfunction during intact abort, including RTLS, TAL, AOA and ATO. -- Launch with a malfunctioning RSS is analyzed as R-975. (4 28 88)

LRB-P-R-979 - The range safety system can cause or be jeopardized by computer system malfunction during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 28 88)

LRB-P-R-980 - The range safety system can cause or be jeopardized by computer system malfunction during descent from separation to ocean impact. -- This hazard is not credible. (4 28 88)

LRB-P-R-981 - The range safety system can cause or be jeopardized by computer system malfunction during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 28 88)

LRB-P-R-982 - The range safety system can cause or be jeopardized by computer system malfunction during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 28 88)

LRB-P-R-983 - The range safety system can cause or be jeopardized by computer system malfunction during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (4 28 88)

LRB-P-R-984 - The range safety system can cause or be jeopardized by computer system malfunction during refurbishment of reusable components. -- This hazard is not credible. (4 28 88)

LRB-P-R-986 - The range safety system can cause or be jeopardized by operator error during manufacture and fabrication of subsystems and components. -- At the

current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-987 - The range safety system can cause or be jeopardized by operator error during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-989 - The range safety system can cause or be jeopardized by operator error during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-990 - The range safety system can cause or be jeopardized by operator error during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-991 - The range safety system can cause or be jeopardized by operator error during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-992 - The range safety system can cause or be jeopardized by operator error during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-993 - The range safety system can cause or be jeopardized by operator error during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-994 - The range safety system can cause or be jeopardized by operator error during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-995 - The range safety system can cause or be jeopardized by operator error during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-996 - The range safety system can cause or be jeopardized by operator error during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-997 - The range safety system can cause or be jeopardized by operator error during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-998 - The range safety system can cause or be jeopardized by operator error during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-999 - The range safety system can cause or be jeopardized by operator error during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-1000 - The range safety system can cause or be jeopardized by operator error during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-1001 - The range safety system can cause or be jeopardized by operator error during nominal flight from liftoff to LRB burnout. -- See comments for R-1002. (4 28 88)

LRB-P-R-1003 - The range safety system can cause or be jeopardized by operator error during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 28 88)

LRB-P-R-1007 - The range safety system can cause or be jeopardized by operator error during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-1008 - The range safety system can cause or be jeopardized by operator error during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-1034 - The range safety system can cause or be jeopardized by emergencies during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-1035 - The range safety system can cause or be jeopardized by emergencies during inspection and test of the LRB and subsystems. -- This hazard is analyzed as E-1035 for electrical components. (4 28 88)

LRB-P-R-1037 - The range safety system can cause or be jeopardized by emergencies during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-1038 - The range safety system can cause or be jeopardized by emergencies during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-1039 - The range safety system can cause or be jeopardized by emergencies during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-1040 - The range safety system can cause or be jeopardized by

emergencies during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-1041 - The range safety system can cause or be jeopardized by emergencies during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-1042 - The range safety system can cause or be jeopardized by emergencies during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-1043 - The range safety system can cause or be jeopardized by emergencies during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-1044 - The range safety system can cause or be jeopardized by emergencies during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-1045 - The range safety system can cause or be jeopardized by emergencies during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-1046 - The range safety system can cause or be jeopardized by emergencies during propellant loading for test or flight. -- This hazard is analyzed as R-542. (4 28 88)

LRB-P-R-1047 - The range safety system can cause or be jeopardized by emergencies during countdown to liftoff or abort. -- This hazard is analyzed as R-543. (4 28 88)

LRB-P-R-1048 - The range safety system can cause or be jeopardized by emergencies during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as R-975. (4 28 88)

LRB-P-R-1049 - The range safety system can cause or be jeopardized by emergencies during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-1050 - The range safety system can cause or be jeopardized by emergencies during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is analyzed as R-1002. (4 28 88)

LRB-P-R-1051 - The range safety system can cause or be jeopardized by emergencies during separation of the LRB from the STS vehicle. -- At the current

state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-1052 - The range safety system can cause or be jeopardized by emergencies during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-1053 - The range safety system can cause or be jeopardized by emergencies during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-1054 - The range safety system can cause or be jeopardized by emergencies during floatation (of recoverable boosters) until recovery. -- This hazard is analyzed as R-598. (4 28 88)

LRB-P-R-1055 - The range safety system can cause or be jeopardized by emergencies during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-R-1056 - The range safety system can cause or be jeopardized by emergencies during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

THESE HAZARDS WERE CONSIDERED BY THE ANALYST BUT WERE NOT FURTHER ANALYZED FOR THE REASONS GIVEN

LRB-P-S-579 - Vehicle structure and material can cause or be jeopardized by unsafe or unhygienic working conditions during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-580 - Vehicle structure and material can cause or be jeopardized by unsafe or unhygienic working conditions during proof test of pressure vessels and structure. -- This hazard is analyzed as G-532. (4 28 88)

LRB-P-S-581 - Vehicle structure and material can cause or be jeopardized by unsafe or unhygienic working conditions during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (4 28 88)

LRB-P-S-582 - Vehicle structure and material can cause or be jeopardized by unsafe or unhygienic working conditions during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-583 - Vehicle structure and material can cause or be jeopardized by unsafe or unhygienic working conditions during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-584 - Vehicle structure and material can cause or be jeopardized by unsafe or unhygienic working conditions during preparation for shipment of the booster and ship loose hardware. -- This hazard is not credible. (4 28 88)

LRB-P-S-585 - Vehicle structure and material can cause or be jeopardized by unsafe or unhygienic working conditions during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (4 28 88)

LRB-P-S-586 - Vehicle structure and material can cause or be jeopardized by unsafe or unhygienic working conditions during storage, including storage of major components. -- This hazard is not credible. (4 28 88)

LRB-P-S-587 - Vehicle structure and material can cause or be jeopardized by unsafe or unhygienic working conditions during preflight checkout prior to stacking. -- This hazard is not credible. (4 28 88)

LRB-P-S-588 - Vehicle structure and material can cause or be jeopardized by unsafe or unhygienic working conditions during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-589 - Vehicle structure and material can cause or be jeopardized by unsafe or unhygienic working conditions during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-590 - Vehicle structure and material can cause or be jeopardized by unsafe or unhygienic working conditions during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-591 - Vehicle structure and material can cause or be jeopardized by unsafe or unhygienic working conditions during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-592 - Vehicle structure and material can cause or be jeopardized by unsafe or unhygienic working conditions during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-598 - Vehicle structure and material can cause or be jeopardized by unsafe or unhygienic working conditions during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 28 88)

LRB-P-S-599 - Vehicle structure and material can cause or be jeopardized by unsafe or unhygienic working conditions during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-600 - Vehicle structure and material can cause or be jeopardized by unsafe or unhygienic working conditions during refurbishment of reusable components. -- This hazard is analyzed as S-578. (4 28 88)

LRB-P-S-678 - Vehicle structure and material can cause or be jeopardized by heat sources during test firing of engines and/or the completed booster. -- This hazard is analyzed as K-679. (4 28 88)

LRB-P-S-679 - Vehicle structure and material can cause or be jeopardized by heat sources during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as K-679. (4 28 88)

LRB-P-S-681 - Vehicle structure and material can cause or be jeopardized by heat sources during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (4 28 88)

LRB-P-S-682 - Vehicle structure and material can cause or be jeopardized by heat sources during storage, including storage of major components. -- This hazard is not credible. (4 28 88)

LRB-P-S-685 - Vehicle structure and material can cause or be jeopardized by heat sources during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 28 88)

LRB-P-S-686 - Vehicle structure and material can cause or be jeopardized by heat sources during propellant loading for test or flight. -- This hazard is not credible. (4 28 88)

LRB-P-S-687 - Vehicle structure and material can cause or be jeopardized by heat sources during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-688 - Vehicle structure and material can cause or be jeopardized by heat sources during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as G-688. (4 28 88)

LRB-P-S-689 - Vehicle structure and material can cause or be jeopardized by heat sources during nominal flight from liftoff to LRB burnout. -- It is assumed that aerodynamic heating and reflected exhaust plume heat loads will be mitigated by thermal protection systems (TPS). (4 28 88)

LRB-P-S-690 - Vehicle structure and material can cause or be jeopardized by heat sources during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-691 - Vehicle structure and material can cause or be jeopardized by heat sources during separation of the LRB from the STS vehicle. -- This hazard is analyzed as B-547 for the ET. It is assumed that the structure of the LRB will be designed to withstand separation loads. (4 28 88)

LRB-P-S-692 - Vehicle structure and material can cause or be jeopardized by heat sources during descent from separation to ocean impact. -- This hazard is not credible. (4 28 88)

LRB-P-S-772 - Vehicle structure and material can cause or be jeopardized by differential pressure during proof test of pressure vessels and structure. -- This hazard is analyzed as G-532 and G-748. (4 28 88)

LRB-P-S-774 - Vehicle structure and material can cause or be jeopardized by differential pressure during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-777 - Vehicle structure and material can cause or be jeopardized by differential pressure during transportation from manufacture to launch site or after recovery. -- This hazard is analyzed as 776. (4 28 88)

LRB-P-S-778 - Vehicle structure and material can cause or be jeopardized by differential pressure during storage, including storage of major components. -- This hazard is not credible. (4 28 88)

LRB-P-S-782 - Vehicle structure and material can cause or be jeopardized by differential pressure during propellant loading for test or flight. -- This hazard is analyzed as K-782. (4 28 88) .

LRB-P-S-783 - Vehicle structure and material can cause or be jeopardized by differential pressure during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-784 - Vehicle structure and material can cause or be jeopardized by differential pressure during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-785 - Vehicle structure and material can cause or be jeopardized by differential pressure during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-786 - Vehicle structure and material can cause or be jeopardized by differential pressure during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-787 - Vehicle structure and material can cause or be jeopardized by differential pressure during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-788 - Vehicle structure and material can cause or be jeopardized by differential pressure during descent from separation to ocean impact. -- This hazard is analyzed as K-788. (4 28 88)

LRB-P-S-789 - Vehicle structure and material can cause or be jeopardized by differential pressure during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-790 - Vehicle structure and material can cause or be jeopardized by differential pressure during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-791 - Vehicle structure and material can cause or be jeopardized by differential pressure during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (4 28 88)

LRB-P-S-798 - Vehicle structure and material can cause or be jeopardized by

vibration, acoustic loads or shock during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-801 - Vehicle structure and material can cause or be jeopardized by vibration, acoustic loads or shock during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (4 28 88)

LRB-P-S-808 - Vehicle structure and material can cause or be jeopardized by vibration, acoustic loads or shock during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-809 - Vehicle structure and material can cause or be jeopardized by vibration, acoustic loads or shock during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-810 - Vehicle structure and material can cause or be jeopardized by vibration, acoustic loads or shock during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-811 - Vehicle structure and material can cause or be jeopardized by vibration, acoustic loads or shock during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-812 - Vehicle structure and material can cause or be jeopardized by vibration, acoustic loads or shock during descent from separation to ocean impact. -- This hazard is not credible. (4 28 88)

LRB-P-S-813 - Vehicle structure and material can cause or be jeopardized by vibration, acoustic loads or shock during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-815 - Vehicle structure and material can cause or be jeopardized by vibration, acoustic loads or shock during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (4 28 88)

LRB-P-S-820 - Vehicle structure and material can cause or be jeopardized by structural loads during proof test of pressure vessels and structure. -- This hazard is analyzed as G-748. (4 28 88)

LRB-P-S-822 - Vehicle structure and material can cause or be jeopardized by structural loads during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-823 - Vehicle structure and material can cause or be jeopardized by

structural loads during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as G-823. (4 28 88)

LRB-P-S-825 - Vehicle structure and material can cause or be jeopardized by structural loads during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (4 28 88)

LRB-P-S-828 - Vehicle structure and material can cause or be jeopardized by structural loads during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (4 28 88)

LRB-P-S-829 - Vehicle structure and material can cause or be jeopardized by structural loads during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 28 88)

LRB-P-S-830 - Vehicle structure and material can cause or be jeopardized by structural loads during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-831 - Vehicle structure and material can cause or be jeopardized by structural loads during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-832 - Vehicle structure and material can cause or be jeopardized by structural loads during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-834 - Vehicle structure and material can cause or be jeopardized by structural loads during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-835 - Vehicle structure and material can cause or be jeopardized by structural loads during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-836 - Vehicle structure and material can cause or be jeopardized by structural loads during descent from separation to ocean impact. -- This hazard is not credible. (4 28 88)

LRB-P-S-837 - Vehicle structure and material can cause or be jeopardized by structural loads during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-838 - Vehicle structure and material can cause or be jeopardized by structural loads during floatation (of recoverable boosters) until recovery. -- This

hazard is analyzed as K-694. (4 28 88)

LRB-P-S-839 - Vehicle structure and material can cause or be jeopardized by structural loads during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (4 28 88)

LRB-P-S-843 - Vehicle structure and material can cause or be jeopardized by leaks during inspection and test of the LRB and subsystems. -- It is assumed that the vehicle structure will be compatible with contained media so that leaks will not be hazardous to the structure. (4 28 88)

LRB-P-S-844 - Vehicle structure and material can cause or be jeopardized by leaks during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-845 - Vehicle structure and material can cause or be jeopardized by leaks during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (4 28 88)

LRB-P-S-846 - Vehicle structure and material can cause or be jeopardized by leaks during test firing of engines and/or the completed booster. -- Any leak would be hazardous during firing, but this appears to be a FMEA item which cannot be properly analyzed at this time. (4 28 88)

LRB-P-S-847 - Vehicle structure and material can cause or be jeopardized by leaks during flight readiness firing (FRF) of the STS vehicle. -- This appears to be a FMEA item which cannot now be properly analyzed. (4 28 88)

LRB-P-S-849 - Vehicle structure and material can cause or be jeopardized by leaks during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (4 28 88)

LRB-P-S-850 - Vehicle structure and material can cause or be jeopardized by leaks during storage, including storage of major components. -- This hazard is not credible. (4 28 88)

LRB-P-S-851 - Vehicle structure and material can cause or be jeopardized by leaks during preflight checkout prior to stacking. -- This hazard is not credible. (4 28 88)

LRB-P-S-852 - Vehicle structure and material can cause or be jeopardized by leaks during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-853 - Vehicle structure and material can cause or be jeopardized by leaks during rollout from the VAB and preloading preparation. -- This appears to be a FMEA item which cannot now be properly analyzed. (4 28 88)

LRB-P-S-854 - Vehicle structure and material can cause or be jeopardized by leaks during propellant loading for test or flight. -- This hazard is analyzed as H-531. (4 28 88)

LRB-P-S-855 - Vehicle structure and material can cause or be jeopardized by leaks during countdown to liftoff or abort. -- This appears to be a FMEA item which cannot now be properly analyzed. (4 28 88)

LRB-P-S-856 - Vehicle structure and material can cause or be jeopardized by leaks during launch abort activities, including mission postponement (scrub). -- This appears to be a FMEA item which cannot now be properly analyzed. (4 28 88)

LRB-P-S-857 - Vehicle structure and material can cause or be jeopardized by leaks during nominal flight from liftoff to LRB burnout. -- This appears to be a FMEA item which cannot now be properly analyzed. (4 28 88)

LRB-P-S-858 - Vehicle structure and material can cause or be jeopardized by leaks during intact abort, including RTLS, TAL, AOA and ATO. -- This appears to be a FMEA item which cannot now be properly analyzed. (4 28 88)

LRB-P-S-859 - Vehicle structure and material can cause or be jeopardized by leaks during separation of the LRB from the STS vehicle. -- This appears to be a FMEA item which cannot now be properly analyzed. (4 28 88)

LRB-P-S-860 - Vehicle structure and material can cause or be jeopardized by leaks during descent from separation to ocean impact. -- This appears to be a FMEA item which cannot now be properly analyzed. (4 28 88)

LRB-P-S-861 - Vehicle structure and material can cause or be jeopardized by leaks during splashdown events occuring at impact (disposable for expendables). -- This appears to be a FMEA item which cannot now be properly analyzed. (4 28 88)

LRB-P-S-862 - Vehicle structure and material can cause or be jeopardized by leaks during floatation (of recoverable boosters) until recovery. -- This appears to be a FMEA item which cannot now be properly analyzed. (4 28 88)

LRB-P-S-863 - Vehicle structure and material can cause or be jeopardized by leaks during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-864 - Vehicle structure and material can cause or be jeopardized by leaks during refurbishment of reusable components. -- This hazard is not credible. (4 28 88)

LRB-P-S-870 - Vehicle structure and material can cause or be jeopardized by propellant characteristics and products during test firing of engines and/or the

completed booster. -- Since the tanks will be designed to contain the propellants employed, it does not appear that propellants will present a hazard. (4 28 88)

LRB-P-S-871 - Vehicle structure and material can cause or be jeopardized by propellant characteristics and products during flight readiness firing (FRF) of the STS vehicle. -- Since the tanks will be designed to contain the propellants employed, it does not appear that this is a credible hazard. (4 28 88)

LRB-P-S-873 - Vehicle structure and material can cause or be jeopardized by propellant characteristics and products during transportation from manufacture to launch site or after recovery. -- Since the tanks will be designed to contain the propellants employed, it does not appear that this is a credible hazard. (4 28 88)

LRB-P-S-874 - Vehicle structure and material can cause or be jeopardized by propellant characteristics and products during storage, including storage of major components. -- Since the tanks will be designed to contain the propellants employed, it does not appear that this is a credible hazard. (4 28 88)

LRB-P-S-877 - Vehicle structure and material can cause or be jeopardized by propellant characteristics and products during rollout from the VAB and preloading preparation. -- This hazard is not credible. (4 28 88)

LRB-P-S-878 - Vehicle structure and material can cause or be jeopardized by propellant characteristics and products during propellant loading for test or flight. -- Since the tanks will be designed to contain the propellants employed, it does not appear that this is a credible hazard. (4 28 88)

LRB-P-S-879 - Vehicle structure and material can cause or be jeopardized by propellant characteristics and products during countdown to liftoff or abort. -- Since the tanks will be designed to contain the propellants employed, it does not appear that this is a credible hazard. (4 28 88)

LRB-P-S-880 - Vehicle structure and material can cause or be jeopardized by propellant characteristics and products during launch abort activities, including mission postponement (scrub). -- Since the tanks will be designed to contain the propellants employed, it does not appear that this is a credible hazard. (4 28 88)

LRB-P-S-881 - Vehicle structure and material can cause or be jeopardized by propellant characteristics and products during nominal flight from liftoff to LRB burnout. -- Since the tanks will be designed to contain the propellants employed, it does not appear that this is a credible hazard. (4 28 88)

LRB-P-S-882 - Vehicle structure and material can cause or be jeopardized by propellant characteristics and products during intact abort, including RTLS, TAL, AOA and ATO. -- Since the tanks will be designed to contain the propellants employed, it does not appear that this is a credible hazard. (4 28 88)

LRB-P-S-883 - Vehicle structure and material can cause or be jeopardized by propellant characteristics and products during separation of the LRB from the STS vehicle. -- Since the tanks will be designed to contain the propellants employed, it does not appear that this is a credible hazard. (4 28 88)

LRB-P-S-884 - Vehicle structure and material can cause or be jeopardized by propellant characteristics and products during descent from separation to ocean impact. -- Since the tanks will be designed to contain the propellants employed, it does not appear that this is a credible hazard. (4 28 88)

LRB-P-S-885 - Vehicle structure and material can cause or be jeopardized by propellant characteristics and products during splashdown events occuring at impact (disposable for expendables). -- Since the tanks will be designed to contain the propellants employed, it does not appear that this is a credible hazard. (4 28 88)

LRB-P-S-886 - Vehicle structure and material can cause or be jeopardized by propellant characteristics and products during floatation (of recoverable boosters) until recovery. -- Since the tanks will be designed to contain the propellants employed, it does not appear that this is a credible hazard. (4 28 88)

LRB-P-S-887 - Vehicle structure and material can cause or be jeopardized by propellant characteristics and products during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-888 - Vehicle structure and material can cause or be jeopardized by propellant characteristics and products during refurbishment of reusable components. -- This hazard is not credible. (4 28 88)

LRB-P-S-894 - Vehicle structure and material can cause or be jeopardized by lightning or electromagnetic discharge during test firing of engines and/or the completed booster. -- It is assumed that test firing will not take place when there is danger from lightning. (4 28 88)

LRB-P-S-895 - Vehicle structure and material can cause or be jeopardized by lightning or electromagnetic discharge during flight readiness firing (FRF) of the STS vehicle. -- It is assumed that test firing will not take place when there is danger from lightning. (4 28 88)

LRB-P-S-897 - Vehicle structure and material can cause or be jeopardized by lightning or electromagnetic discharge during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-898 - Vehicle structure and material can cause or be jeopardized by lightning or electromagnetic discharge during storage, including storage of major

components. -- This hazard is not credible. (4 28 88)

LRB-P-S-902 - Vehicle structure and material can cause or be jeopardized by lightning or electromagnetic discharge during propellant loading for test or flight. -- This hazard is analyzed as S-901. (4 28 88)

LRB-P-S-903 - Vehicle structure and material can cause or be jeopardized by lightning or electromagnetic discharge during countdown to liftoff or abort. -- This hazard is analyzed as S-901. (4 28 88)

LRB-P-S-904 - Vehicle structure and material can cause or be jeopardized by lightning or electromagnetic discharge during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as S-901. (4 28 88)

LRB-P-S-905 - Vehicle structure and material can cause or be jeopardized by lightning or electromagnetic discharge during nominal flight from liftoff to LRB burnout. -- This hazard is analyzed as S-901. (4 28 88)

LRB-P-S-906 - Vehicle structure and material can cause or be jeopardized by lightning or electromagnetic discharge during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is analyzed as S-901. (4 28 88)

LRB-P-S-907 - Vehicle structure and material can cause or be jeopardized by lightning or electromagnetic discharge during separation of the LRB from the STS vehicle. -- This hazard is analyzed as S-901. (4 28 88)

LRB-P-S-908 - Vehicle structure and material can cause or be jeopardized by lightning or electromagnetic discharge during descent from separation to ocean impact. -- This hazard is analyzed as S-901. (4 28 88)

LRB-P-S-909 - Vehicle structure and material can cause or be jeopardized by lightning or electromagnetic discharge during splashdown events occuring at impact (disposable for expendables). -- This hazard is analyzed as S-901. (4 28 88)

LRB-P-S-910 - Vehicle structure and material can cause or be jeopardized by lightning or electromagnetic discharge during floatation (of recoverable boosters) until recovery. -- This hazard is analyzed as S-901. (4 28 88)

LRB-P-S-911 - Vehicle structure and material can cause or be jeopardized by lightning or electromagnetic discharge during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-938 - Vehicle structure and material can cause or be jeopardized by chemical activity during manufacture and fabrication of subsystems and components. -- This hazard is analyzed as S-578. (4 28 88)

LRB-P-S-939 - Vehicle structure and material can cause or be jeopardized by chemical activity during inspection and test of the LRB and subsystems. -- This hazard is analyzed as E-843. (4 28 88)

LRB-P-S-940 - Vehicle structure and material can cause or be jeopardized by chemical activity during proof test of pressure vessels and structure. -- This hazard is not credible. (4 28 88)

LRB-P-S-941 - Vehicle structure and material can cause or be jeopardized by chemical activity during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (4 28 88)

LRB-P-S-942 - Vehicle structure and material can cause or be jeopardized by chemical activity during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-943 - Vehicle structure and material can cause or be jeopardized by chemical activity during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-944 - Vehicle structure and material can cause or be jeopardized by chemical activity during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-945 - Vehicle structure and material can cause or be jeopardized by chemical activity during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-946 - Vehicle structure and material can cause or be jeopardized by chemical activity during storage, including storage of major components. -- This hazard is not credible. (4 28 88)

LRB-P-S-947 - Vehicle structure and material can cause or be jeopardized by chemical activity during preflight checkout prior to stacking. -- This hazard is not credible. (4 28 88)

LRB-P-S-948 - Vehicle structure and material can cause or be jeopardized by chemical activity during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (4 28 88)

LRB-P-S-949 - Vehicle structure and material can cause or be jeopardized by chemical activity during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-950 - Vehicle structure and material can cause or be jeopardized by chemical activity during propellant loading for test or flight. -- This hazard is analyzed as I-542. (4 28 88)

LRB-P-S-951 - Vehicle structure and material can cause or be jeopardized by chemical activity during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-952 - Vehicle structure and material can cause or be jeopardized by chemical activity during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-953 - Vehicle structure and material can cause or be jeopardized by chemical activity during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-954 - Vehicle structure and material can cause or be jeopardized by chemical activity during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-955 - Vehicle structure and material can cause or be jeopardized by chemical activity during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-956 - Vehicle structure and material can cause or be jeopardized by chemical activity during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-957 - Vehicle structure and material can cause or be jeopardized by chemical activity during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-958 - Vehicle structure and material can cause or be jeopardized by chemical activity during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-959 - Vehicle structure and material can cause or be jeopardized by chemical activity during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (4 28 88)

LRB-P-S-960 - Vehicle structure and material can cause or be jeopardized by chemical activity during refurbishment of reusable components. -- This hazard is not credible. (4 28 88)

LRB-P-S-986 - Vehicle structure and material can cause or be jeopardized by

operator error during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-987 - Vehicle structure and material can cause or be jeopardized by operator error during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-988 - Vehicle structure and material can cause or be jeopardized by operator error during proof test of pressure vessels and structure. -- This hazard is analyzed as G-988. (4 28 88)

LRB-P-S-989 - Vehicle structure and material can cause or be jeopardized by operator error during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-990 - Vehicle structure and material can cause or be jeopardized by operator error during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-991 - Vehicle structure and material can cause or be jeopardized by operator error during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-992 - Vehicle structure and material can cause or be jeopardized by operator error during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-993 - Vehicle structure and material can cause or be jeopardized by operator error during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-994 - Vehicle structure and material can cause or be jeopardized by operator error during storage, including storage of major components. -- This hazard is not credible. (4 28 88)

LRB-P-S-995 - Vehicle structure and material can cause or be jeopardized by operator error during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-996 - Vehicle structure and material can cause or be jeopardized by operator error during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-997 - Vehicle structure and material can cause or be jeopardized by

operator error during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-998 - Vehicle structure and material can cause or be jeopardized by operator error during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-999 - Vehicle structure and material can cause or be jeopardized by operator error during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-1000 - Vehicle structure and material can cause or be jeopardized by operator error during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-1001 - Vehicle structure and material can cause or be jeopardized by operator error during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-1002 - Vehicle structure and material can cause or be jeopardized by operator error during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (4 28 88)

LRB-P-S-1003 - Vehicle structure and material can cause or be jeopardized by operator error during separation of the LRB from the STS vehicle. -- This hazard is not credible. (4 28 88)

LRB-P-S-1007 - Vehicle structure and material can cause or be jeopardized by operator error during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-1008 - Vehicle structure and material can cause or be jeopardized by operator error during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-1034 - Vehicle structure and material can cause or be jeopardized by emergencies during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-1035 - Vehicle structure and material can cause or be jeopardized by emergencies during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-1036 - Vehicle structure and material can cause or be jeopardized by emergencies during proof test of pressure vessels and structure. -- At the current

state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-1037 - Vehicle structure and material can cause or be jeopardized by emergencies during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-1038 - Vehicle structure and material can cause or be jeopardized by emergencies during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-1039 - Vehicle structure and material can cause or be jeopardized by emergencies during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-1040 - Vehicle structure and material can cause or be jeopardized by emergencies during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-1041 - Vehicle structure and material can cause or be jeopardized by emergencies during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-1042 - Vehicle structure and material can cause or be jeopardized by emergencies during storage, including storage of major components. -- This hazard is not credible. (4 28 88)

LRB-P-S-1043 - Vehicle structure and material can cause or be jeopardized by emergencies during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-1044 - Vehicle structure and material can cause or be jeopardized by emergencies during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-1045 - Vehicle structure and material can cause or be jeopardized by emergencies during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-1047 - Vehicle structure and material can cause or be jeopardized by emergencies during countdown to liftoff or abort. -- This hazard is analyzed as S-1046. (4 28 88)

LRB-P-S-1048 - Vehicle structure and material can cause or be jeopardized by emergencies during launch abort activities, including mission postponement (scrub).

-- This hazard is analyzed as S-1046. (4 28 88)

LRB-P-S-1049 - Vehicle structure and material can cause or be jeopardized by emergencies during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-1050 - Vehicle structure and material can cause or be jeopardized by emergencies during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-1051 - Vehicle structure and material can cause or be jeopardized by emergencies during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-1052 - Vehicle structure and material can cause or be jeopardized by emergencies during descent from separation to ocean impact. -- This hazard is not credible. (4 28 88)

LRB-P-S-1053 - Vehicle structure and material can cause or be jeopardized by emergencies during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (4 28 88)

LRB-P-S-1054 - Vehicle structure and material can cause or be jeopardized by emergencies during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (4 28 88)

LRB-P-S-1055 - Vehicle structure and material can cause or be jeopardized by emergencies during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

LRB-P-S-1056 - Vehicle structure and material can cause or be jeopardized by emergencies during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (4 28 88)

THESE HAZARDS WERE CONSIDERED BY THE ANALYST BUT
WERE NOT FURTHER ANALYZED FOR THE REASONS GIVEN

LRB-P-T-578 - Thermal protection subsystems can cause or be jeopardized by unsafe or unhygienic working conditions during manufacture and fabrication of subsystems and components. -- The current configuration of LRB TPS indicates that materials and processes will be essentially the same as those used in the fabrication of the External Tank. The proven safety program for the ET will therefore be sufficient for the LRB. (5 2 88)

LRB-P-T-579 - Thermal protection subsystems can cause or be jeopardized by unsafe or unhygienic working conditions during inspection and test of the LRB and subsystems. -- See comments for T-578. (5 2 88)

LRB-P-T-580 - Thermal protection subsystems can cause or be jeopardized by unsafe or unhygienic working conditions during proof test of pressure vessels and structure. -- TPS will not be applied before proof test. (5 2 88)

LRB-P-T-581 - Thermal protection subsystems can cause or be jeopardized by unsafe or unhygienic working conditions during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (5 2 88)

LRB-P-T-582 - Thermal protection subsystems can cause or be jeopardized by unsafe or unhygienic working conditions during test firing of engines and/or the completed booster. -- This hazard is not credible. (5 2 88)

LRB-P-T-583 - Thermal protection subsystems can cause or be jeopardized by unsafe or unhygienic working conditions during flight readiness firing (FRF) of the STS vehicle. -- This hazard is not credible. (5 2 88)

LRB-P-T-584 - Thermal protection subsystems can cause or be jeopardized by unsafe or unhygienic working conditions during preparation for shipment of the booster and ship loose hardware. -- This hazard is not credible. (5 2 88)

LRB-P-T-585 - Thermal protection subsystems can cause or be jeopardized by unsafe or unhygienic working conditions during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (5 2 88)

LRB-P-T-586 - Thermal protection subsystems can cause or be jeopardized by unsafe or unhygienic working conditions during storage, including storage of major components. -- This hazard is not credible. (5 2 88)

LRB-P-T-587 - Thermal protection subsystems can cause or be jeopardized by unsafe or unhygienic working conditions during preflight checkout prior to stacking. -- This hazard is not credible. (5 2 88)

LRB-P-T-588 - Thermal protection subsystems can cause or be jeopardized by unsafe or unhygienic working conditions during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (5 2 88)

LRB-P-T-589 - Thermal protection subsystems can cause or be jeopardized by unsafe or unhygienic working conditions during rollout from the VAB and preloading preparation. -- This hazard is not credible. (5 2 88)

LRB-P-T-590 - Thermal protection subsystems can cause or be jeopardized by unsafe or unhygienic working conditions during propellant loading for test or flight. -- This hazard is not credible. (5 2 88)

LRB-P-T-591 - Thermal protection subsystems can cause or be jeopardized by unsafe or unhygienic working conditions during countdown to liftoff or abort. -- Hazards associated with ice/frost inspection are analyzed as I-579. (5 2 88)

LRB-P-T-592 - Thermal protection subsystems can cause or be jeopardized by unsafe or unhygienic working conditions during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (5 2 88)

LRB-P-T-598 - Thermal protection subsystems can cause or be jeopardized by unsafe or unhygienic working conditions during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (5 2 88)

LRB-P-T-599 - Thermal protection subsystems can cause or be jeopardized by unsafe or unhygienic working conditions during recovery activities, including towing, and retrieval of recoverables. -- If boosters are recoverable, it is assumed that TPS will be stripped and replaced. (5 2 88)

LRB-P-T-600 - Thermal protection subsystems can cause or be jeopardized by unsafe or unhygienic working conditions during refurbishment of reusable components. -- See comments for T-578. (5 2 88)

LRB-P-T-678 - Thermal protection subsystems can cause or be jeopardized by heat sources during test firing of engines and/or the completed booster. -- It is assumed that TPS design will take all test firing conditions, including FRF, into consideration and that the TPS will be designed for the worst case loads or that adequate protection will be provided during test firing and FRF. (5 2 88)

LRB-P-T-679 - Thermal protection subsystems can cause or be jeopardized by heat sources during flight readiness firing (FRF) of the STS vehicle. -- See comments for T-678. (5 2 88)

LRB-P-T-681 - Thermal protection subsystems can cause or be jeopardized by heat sources during transportation from manufacture to launch site or after recovery. --

This hazard is not credible. (5 2 88)

LRB-P-T-682 - Thermal protection subsystems can cause or be jeopardized by heat sources during storage, including storage of major components. -- This hazard is not credible. (5 2 88)

LRB-P-T-685 - Thermal protection subsystems can cause or be jeopardized by heat sources during rollout from the VAB and preloading preparation. -- This hazard is not credible. (5 2 88)

LRB-P-T-686 - Thermal protection subsystems can cause or be jeopardized by heat sources during propellant loading for test or flight. -- This hazard is not credible. (5 2 88)

LRB-P-T-687 - Thermal protection subsystems can cause or be jeopardized by heat sources during countdown to liftoff or abort. -- This hazard is not credible. (5 2 88)

LRB-P-T-688 - Thermal protection subsystems can cause or be jeopardized by heat sources during launch abort activities, including mission postponement (scrub). -- It is assumed that the TPS design will take launch abort conditions into consideration. (5 2 88)

LRB-P-T-689 - Thermal protection subsystems can cause or be jeopardized by heat sources during nominal flight from liftoff to LRB burnout. -- This is the design condition. (5 2 88)

LRB-P-T-690 - Thermal protection subsystems can cause or be jeopardized by heat sources during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (5 2 88)

LRB-P-T-691 - Thermal protection subsystems can cause or be jeopardized by heat sources during separation of the LRB from the STS vehicle. -- This hazard is not credible. (5 2 88)

LRB-P-T-692 - Thermal protection subsystems can cause or be jeopardized by heat sources during descent from separation to ocean impact. -- This hazard is not credible. (5 2 88)

LRB-P-T-699 - Thermal protection subsystems can cause or be jeopardized by radiation or sunlight during inspection and test of the LRB and subsystems. -- This hazard is not credible. (5 2 88)

LRB-P-T-701 - Thermal protection subsystems can cause or be jeopardized by radiation or sunlight during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (5 2 88)

LRB-P-T-702 - Thermal protection subsystems can cause or be jeopardized by radiation or sunlight during test firing of engines and/or the completed booster. -- This hazard is not credible. (5 2 88)

LRB-P-T-703 - Thermal protection subsystems can cause or be jeopardized by radiation or sunlight during flight readiness firing (FRF) of the STS vehicle. -- This hazard is not credible. (5 2 88)

LRB-P-T-705 - Thermal protection subsystems can cause or be jeopardized by radiation or sunlight during transportation from manufacture to launch site or after recovery. -- See the comment for T-709. (5 2 88)

LRB-P-T-708 - Thermal protection subsystems can cause or be jeopardized by radiation or sunlight during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (5 2 88)

LRB-P-T-709 - Thermal protection subsystems can cause or be jeopardized by radiation or sunlight during rollout from the VAB and preloading preparation. -- Sunlight is known to cause a color change in ET TPS, and it is assumed that this will take place on the LRB also. This has not been found to be harmful to the ET. (5 2 88)

LRB-P-T-710 - Thermal protection subsystems can cause or be jeopardized by radiation or sunlight during propellant loading for test or flight. -- See the comment for T-709. (5 2 88)

LRB-P-T-711 - Thermal protection subsystems can cause or be jeopardized by radiation or sunlight during countdown to liftoff or abort. -- See comments for T-709. (5 2 88)

LRB-P-T-712 - Thermal protection subsystems can cause or be jeopardized by radiation or sunlight during launch abort activities, including mission postponement (scrub). -- See comments for T-709. (5 2 88)

LRB-P-T-713 - Thermal protection subsystems can cause or be jeopardized by radiation or sunlight during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (5 2 88)

LRB-P-T-714 - Thermal protection subsystems can cause or be jeopardized by radiation or sunlight during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (5 2 88)

LRB-P-T-715 - Thermal protection subsystems can cause or be jeopardized by radiation or sunlight during separation of the LRB from the STS vehicle. -- This hazard is not credible. (5 2 88)

LRB-P-T-716 - Thermal protection subsystems can cause or be jeopardized by radiation or sunlight during descent from separation to ocean impact. -- This hazard is not credible. (5 2 88)

LRB-P-T-717 - Thermal protection subsystems can cause or be jeopardized by radiation or sunlight during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (5 2 88)

LRB-P-T-718 - Thermal protection subsystems can cause or be jeopardized by radiation or sunlight during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (5 2 88)

LRB-P-T-719 - Thermal protection subsystems can cause or be jeopardized by radiation or sunlight during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (5 2 88)

LRB-P-T-720 - Thermal protection subsystems can cause or be jeopardized by radiation or sunlight during refurbishment of reusable components. -- This hazard is not credible. (5 2 88)

LRB-P-T-724 - Thermal protection subsystems can cause or be jeopardized by moisture or precipitation during proof test of pressure vessels and structure. -- This hazard is not credible. (5 2 88)

LRB-P-T-726 - Thermal protection subsystems can cause or be jeopardized by moisture or precipitation during test firing of engines and/or the completed booster. -- This hazard is not credible. (5 2 88)

LRB-P-T-727 - Thermal protection subsystems can cause or be jeopardized by moisture or precipitation during flight readiness firing (FRF) of the STS vehicle. -- This hazard is not credible. (5 2 88)

LRB-P-T-729 - Thermal protection subsystems can cause or be jeopardized by moisture or precipitation during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (5 2 88)

LRB-P-T-730 - Thermal protection subsystems can cause or be jeopardized by moisture or precipitation during storage, including storage of major components. -- This hazard is not credible. (5 2 88)

LRB-P-T-731 - Thermal protection subsystems can cause or be jeopardized by moisture or precipitation during preflight checkout prior to stacking. -- This hazard is not credible. (5 2 88)

LRB-P-T-732 - Thermal protection subsystems can cause or be jeopardized by moisture or precipitation during vehicle stacking, including ancillary test activities. --

This hazard is not credible. (5 2 88)

LRB-P-T-733 - Thermal protection subsystems can cause or be jeopardized by moisture or precipitation during rollout from the VAB and preloading preparation. -- Since LRB TPS will be similar to that on the ET, it is not likely to be damaged by any rain which will not damage the ET. (5 2 88)

LRB-P-T-734 - Thermal protection subsystems can cause or be jeopardized by moisture or precipitation during propellant loading for test or flight. -- Since LRB TPS will be similar to that on the ET, it is not likely to be damaged by any rain which will not damage the ET. (5 2 88)

LRB-P-T-735 - Thermal protection subsystems can cause or be jeopardized by moisture or precipitation during countdown to liftoff or abort. -- Since LRB TPS will be similar to that on the ET, it is not likely to be damaged by any rain which will not damage the ET. (5 2 88)

LRB-P-T-736 - Thermal protection subsystems can cause or be jeopardized by moisture or precipitation during launch abort activities, including mission postponement (scrub). -- Since LRB TPS will be similar to that on the ET, it is not likely to be damaged by any rain which will not damage the ET. (5 2 88)

LRB-P-T-737 - Thermal protection subsystems can cause or be jeopardized by moisture or precipitation during nominal flight from liftoff to LRB burnout. -- Since LRB TPS will be similar to that on the ET, it is not likely to be damaged by any rain which will not damage the ET. (5 2 88)

LRB-P-T-738 - Thermal protection subsystems can cause or be jeopardized by moisture or precipitation during intact abort, including RTLS, TAL, AOA and ATO. -- Since LRB TPS will be similar to that on the ET, it is not likely to be damaged by any rain which will not damage the ET. (5 2 88)

LRB-P-T-739 - Thermal protection subsystems can cause or be jeopardized by moisture or precipitation during separation of the LRB from the STS vehicle. -- This hazard is not credible. (5 2 88)

LRB-P-T-740 - Thermal protection subsystems can cause or be jeopardized by moisture or precipitation during descent from separation to ocean impact. -- This hazard is not credible. (5 2 88)

LRB-P-T-741 - Thermal protection subsystems can cause or be jeopardized by moisture or precipitation during splashdown events occuring at impact (disposable for expendables). -- It is assumed that TPS on recoverable boosters will be stripped and replaced prior to reuse. (5 2 88)

LRB-P-T-742 - Thermal protection subsystems can cause or be jeopardized by

moisture or precipitation during floatation (of recoverable boosters) until recovery. -- It is assumed that TPS on recoverable boosters will be stripped and replaced prior to reuse. (5 2 88)

LRB-P-T-743 - Thermal protection subsystems can cause or be jeopardized by moisture or precipitation during recovery activities, including towing, and retrieval of recoverables. -- It is assumed that TPS on recoverable boosters will be stripped and replaced prior to reuse. (5 2 88)

LRB-P-T-744 - Thermal protection subsystems can cause or be jeopardized by moisture or precipitation during refurbishment of reusable components. -- It is assumed that TPS on recoverable boosters will be stripped and replaced prior to reuse. (5 2 88)

LRB-P-T-798 - Thermal protection subsystems can cause or be jeopardized by vibration, acoustic loads or shock during test firing of engines and/or the completed booster. -- Properly applied TPS is not particularly sensitive to acoustic loads. Therefore, it is assumed that damage to TPS from this cause is unlikely. (5 2 88)

LRB-P-T-799 - Thermal protection subsystems can cause or be jeopardized by vibration, acoustic loads or shock during flight readiness firing (FRF) of the STS vehicle. -- Properly applied TPS is not particularly sensitive to acoustic loads. Therefore, it is assumed that damage to TPS from this cause is unlikely. (5 2 88)

LRB-P-T-801 - Thermal protection subsystems can cause or be jeopardized by vibration, acoustic loads or shock during transportation from manufacture to launch site or after recovery. -- Properly applied TPS is not particularly sensitive to acoustic loads. Therefore, it is assumed that damage to TPS from this cause is unlikely. (5 2 88)

LRB-P-T-808 - Thermal protection subsystems can cause or be jeopardized by vibration, acoustic loads or shock during launch abort activities, including mission postponement (scrub). -- Properly applied TPS is not particularly sensitive to acoustic loads. Therefore, it is assumed that damage to TPS from this cause is unlikely. (5 2 88)

LRB-P-T-809 - Thermal protection subsystems can cause or be jeopardized by vibration, acoustic loads or shock during nominal flight from liftoff to LRB burnout. -- Properly applied TPS is not particularly sensitive to acoustic loads. Therefore, it is assumed that damage to TPS from this cause is unlikely. (5 2 88)

LRB-P-T-810 - Thermal protection subsystems can cause or be jeopardized by vibration, acoustic loads or shock during intact abort, including RTLS, TAL, AOA and ATO. -- Properly applied TPS is not particularly sensitive to acoustic loads. Therefore, it is assumed that damage to TPS from this cause is unlikely. (5 2 88)

LRB-P-T-811 - Thermal protection subsystems can cause or be jeopardized by vibration, acoustic loads or shock during separation of the LRB from the STS vehicle. -- This hazard is not credible. (5 2 88)

LRB-P-T-812 - Thermal protection subsystems can cause or be jeopardized by vibration, acoustic loads or shock during descent from separation to ocean impact. -- This hazard is not credible. (5 2 88)

LRB-P-T-813 - Thermal protection subsystems can cause or be jeopardized by vibration, acoustic loads or shock during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (5 2 88)

LRB-P-T-815 - Thermal protection subsystems can cause or be jeopardized by vibration, acoustic loads or shock during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (5 2 88)

LRB-P-T-843 - Thermal protection subsystems can cause or be jeopardized by leaks during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (5 2 88)

LRB-P-T-844 - Thermal protection subsystems can cause or be jeopardized by leaks during proof test of pressure vessels and structure. -- Due to the thickness of the tanks, a leak during proof test is unlikely. The expected mode of failure would be burst. Bursting during proof test is analyzed as G-532. In any case, the tanks and structure are not expected to be covered with TPS until after proof test. (5 2 88)

LRB-P-T-845 - Thermal protection subsystems can cause or be jeopardized by leaks during acceptance test and checkout prior to delivery to the Government. -- This hazard is not credible. (5 2 88)

LRB-P-T-847 - Thermal protection subsystems can cause or be jeopardized by leaks during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as T-846. (5 2 88)

LRB-P-T-849 - Thermal protection subsystems can cause or be jeopardized by leaks during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (5 2 88)

LRB-P-T-850 - Thermal protection subsystems can cause or be jeopardized by leaks during storage, including storage of major components. -- This hazard is not credible. (5 2 88)

LRB-P-T-851 - Thermal protection subsystems can cause or be jeopardized by leaks during preflight checkout prior to stacking. -- This hazard is not credible. (5 2 88)

LRB-P-T-852 - Thermal protection subsystems can cause or be jeopardized by leaks

during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (5 2 88)

LRB-P-T-853 - Thermal protection subsystems can cause or be jeopardized by leaks during rollout from the VAB and preloading preparation. -- This hazard is not credible. (5 2 88)

LRB-P-T-854 - Thermal protection subsystems can cause or be jeopardized by leaks during propellant loading for test or flight. -- This hazard is analyzed as T-846. (5 2 88)

LRB-P-T-855 - Thermal protection subsystems can cause or be jeopardized by leaks during countdown to liftoff or abort. -- This hazard is analyzed as T-846. (5 2 88)

LRB-P-T-856 - Thermal protection subsystems can cause or be jeopardized by leaks during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as T-846. (5 2 88)

LRB-P-T-857 - Thermal protection subsystems can cause or be jeopardized by leaks during nominal flight from liftoff to LRB burnout. -- This hazard is analyzed as T-846. (5 2 88)

LRB-P-T-858 - Thermal protection subsystems can cause or be jeopardized by leaks during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is analyzed as T-846. (5 2 88)

LRB-P-T-859 - Thermal protection subsystems can cause or be jeopardized by leaks during separation of the LRB from the STS vehicle. -- This hazard is not credible. (5 2 88)

LRB-P-T-860 - Thermal protection subsystems can cause or be jeopardized by leaks during descent from separation to ocean impact. -- This hazard is not credible. (5 2 88)

LRB-P-T-861 - Thermal protection subsystems can cause or be jeopardized by leaks during splashdown events occuring at impact (disposable for expendables). -- It is assumed that TPS on recoverable boosters will be stripped and replaced during refurbishment. (5 2 88)

LRB-P-T-862 - Thermal protection subsystems can cause or be jeopardized by leaks during floatation (of recoverable boosters) until recovery. -- It is assumed that TPS on recoverable boosters will be stripped and replaced during refurbishment. (5 2 88)

LRB-P-T-863 - Thermal protection subsystems can cause or be jeopardized by leaks during recovery activities, including towing, and retrieval of recoverables. -- It is assumed that TPS on recoverable boosters will be stripped and replaced during

refurbishment. (5 2 88)

LRB-P-T-864 - Thermal protection subsystems can cause or be jeopardized by leaks during refurbishment of reusable components. -- It is assumed that TPS on recoverable boosters will be stripped and replaced during refurbishment. (5 2 88)

LRB-P-T-871 - Thermal protection subsystems can cause or be jeopardized by propellant characteristics and products during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as T-870. (5 2 88)

LRB-P-T-873 - Thermal protection subsystems can cause or be jeopardized by propellant characteristics and products during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (5 2 88)

LRB-P-T-874 - Thermal protection subsystems can cause or be jeopardized by propellant characteristics and products during storage, including storage of major components. -- This hazard is not credible. (5 2 88)

LRB-P-T-877 - Thermal protection subsystems can cause or be jeopardized by propellant characteristics and products during rollout from the VAB and preloading preparation. -- This hazard is not credible. (5 2 88)

LRB-P-T-878 - Thermal protection subsystems can cause or be jeopardized by propellant characteristics and products during propellant loading for test or flight. -- This hazard is analyzed as T-870. (5 2 88)

LRB-P-T-879 - Thermal protection subsystems can cause or be jeopardized by propellant characteristics and products during countdown to liftoff or abort. -- This hazard is analyzed as T-870. (5 2 88)

LRB-P-T-880 - Thermal protection subsystems can cause or be jeopardized by propellant characteristics and products during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as T-870. (5 2 88)

LRB-P-T-881 - Thermal protection subsystems can cause or be jeopardized by propellant characteristics and products during nominal flight from liftoff to LRB burnout. -- This hazard is analyzed as T-870. (5 2 88)

LRB-P-T-882 - Thermal protection subsystems can cause or be jeopardized by propellant characteristics and products during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is analyzed as T-870. (5 2 88)

LRB-P-T-883 - Thermal protection subsystems can cause or be jeopardized by propellant characteristics and products during separation of the LRB from the STS vehicle. -- This hazard is not credible. (5 2 88)

LRB-P-T-884 - Thermal protection subsystems can cause or be jeopardized by propellant characteristics and products during descent from separation to ocean impact. -- This hazard is not credible. (5 2 88)

LRB-P-T-885 - Thermal protection subsystems can cause or be jeopardized by propellant characteristics and products during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (5 2 88)

LRB-P-T-886 - Thermal protection subsystems can cause or be jeopardized by propellant characteristics and products during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (5 2 88)

LRB-P-T-887 - Thermal protection subsystems can cause or be jeopardized by propellant characteristics and products during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (5 2 88)

LRB-P-T-888 - Thermal protection subsystems can cause or be jeopardized by propellant characteristics and products during refurbishment of reusable components. -- This hazard is not credible. (5 2 88)

LRB-P-T-894 - Thermal protection subsystems can cause or be jeopardized by lightning or electromagnetic discharge during test firing of engines and/or the completed booster. -- It is assumed that test firing will not take place when there is danger of lightning. (5 2 88)

LRB-P-T-895 - Thermal protection subsystems can cause or be jeopardized by lightning or electromagnetic discharge during flight readiness firing (FRF) of the STS vehicle. -- It is assumed that test firing will not take place when there is danger of lightning. (5 2 88)

LRB-P-T-897 - Thermal protection subsystems can cause or be jeopardized by lightning or electromagnetic discharge during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (5 2 88)

LRB-P-T-898 - Thermal protection subsystems can cause or be jeopardized by lightning or electromagnetic discharge during storage, including storage of major components. -- This hazard is not credible. (5 2 88)

LRB-P-T-902 - Thermal protection subsystems can cause or be jeopardized by lightning or electromagnetic discharge during propellant loading for test or flight. -- This hazard is analyzed as T-901. (5 2 88)

LRB-P-T-903 - Thermal protection subsystems can cause or be jeopardized by lightning or electromagnetic discharge during countdown to liftoff or abort. -- This hazard is analyzed as T-901. (5 2 88)

LRB-P-T-904 - Thermal protection subsystems can cause or be jeopardized by lightning or electromagnetic discharge during launch abort activities, including mission postponement (scrub). -- This hazard is analyzed as T-901. (5 2 88)

LRB-P-T-905 - Thermal protection subsystems can cause or be jeopardized by lightning or electromagnetic discharge during nominal flight from liftoff to LRB burnout. -- This hazard is analyzed as T-901. (5 2 88)

LRB-P-T-906 - Thermal protection subsystems can cause or be jeopardized by lightning or electromagnetic discharge during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is analyzed as T-901. (5 2 88)

LRB-P-T-907 - Thermal protection subsystems can cause or be jeopardized by lightning or electromagnetic discharge during separation of the LRB from the STS vehicle. -- This hazard is not credible. (5 2 88)

LRB-P-T-908 - Thermal protection subsystems can cause or be jeopardized by lightning or electromagnetic discharge during descent from separation to ocean impact. -- It is assumed that TPS will be stripped and replaced before reuse of recoverable boosters. (5 2 88)

LRB-P-T-909 - Thermal protection subsystems can cause or be jeopardized by lightning or electromagnetic discharge during splashdown events occuring at impact (disposable for expendables). -- It is assumed that TPS will be stripped and replaced before reuse of recoverable boosters. (5 2 88)

LRB-P-T-910 - Thermal protection subsystems can cause or be jeopardized by lightning or electromagnetic discharge during floatation (of recoverable boosters) until recovery. -- It is assumed that TPS will be stripped and replaced before reuse of recoverable boosters. (5 2 88)

LRB-P-T-911 - Thermal protection subsystems can cause or be jeopardized by lightning or electromagnetic discharge during recovery activities, including towing, and retrieval of recoverables. -- It is assumed that TPS will be stripped and replaced before reuse of recoverable boosters. (5 2 88)

LRB-P-T-1011 - Thermal protection subsystems can cause or be jeopardized by wear during inspection and test of the LRB and subsystems. -- TPS is not expected to be subject to wear except by aerodynamic environments for which it will be designed. (5 2 88)

LRB-P-T-1012 - Thermal protection subsystems can cause or be jeopardized by wear during proof test of pressure vessels and structure. -- TPS is not expected to be subject to wear except by aerodynamic environments for which it will be designed. There will be no TPS on the booster during proof test. (5 2 88)

LRB-P-T-1013 - Thermal protection subsystems can cause or be jeopardized by wear during acceptance test and checkout prior to delivery to the Government. -- TPS is not expected to be subject to wear except by aerodynamic environments for which it will be designed. (5 2 88)

LRB-P-T-1014 - Thermal protection subsystems can cause or be jeopardized by wear during test firing of engines and/or the completed booster. -- TPS is not expected to be subject to wear except by aerodynamic environments for which it will be designed. (5 2 88)

LRB-P-T-1015 - Thermal protection subsystems can cause or be jeopardized by wear during flight readiness firing (FRF) of the STS vehicle. -- TPS is not expected to be subject to wear except by aerodynamic environments for which it will be designed. (5 2 88)

LRB-P-T-1017 - Thermal protection subsystems can cause or be jeopardized by wear during transportation from manufacture to launch site or after recovery. -- TPS is not expected to be subject to wear except by aerodynamic environments for which it will be designed. (5 2 88)

LRB-P-T-1020 - Thermal protection subsystems can cause or be jeopardized by wear during vehicle stacking, including ancillary test activities. -- TPS is not expected to be subject to wear except by aerodynamic environments for which it will be designed. (5 2 88)

LRB-P-T-1021 - Thermal protection subsystems can cause or be jeopardized by wear during rollout from the VAB and preloading preparation. -- TPS is not expected to be subject to wear except by aerodynamic environments for which it will be designed. (5 2 88)

LRB-P-T-1022 - Thermal protection subsystems can cause or be jeopardized by wear during propellant loading for test or flight. -- TPS is not expected to be subject to wear except by aerodynamic environments for which it will be designed. (5 2 88)

LRB-P-T-1023 - Thermal protection subsystems can cause or be jeopardized by wear during countdown to liftoff or abort. -- TPS is not expected to be subject to wear except by aerodynamic environments for which it will be designed. (5 2 88)

LRB-P-T-1024 - Thermal protection subsystems can cause or be jeopardized by wear during launch abort activities, including mission postponement (scrub). -- TPS is not expected to be subject to wear except by aerodynamic environments for which it will be designed. (5 2 88)

LRB-P-T-1025 - Thermal protection subsystems can cause or be jeopardized by wear during nominal flight from liftoff to LRB burnout. -- TPS is not expected to be subject to wear except by aerodynamic environments for which it will be designed. (5 2 88)

LRB-P-T-1026 - Thermal protection subsystems can cause or be jeopardized by wear during intact abort, including RTLS, TAL, AOA and ATO. -- TPS is not expected to be subject to wear except by aerodynamic environments for which it will be designed. (5 2 88)

LRB-P-T-1027 - Thermal protection subsystems can cause or be jeopardized by wear during separation of the LRB from the STS vehicle. -- TPS is not expected to be subject to wear except by aerodynamic environments for which it will be designed. (5 2 88)

LRB-P-T-1028 - Thermal protection subsystems can cause or be jeopardized by wear during descent from separation to ocean impact. -- TPS is not expected to be subject to wear except by aerodynamic environments for which it will be designed. (5 2 88)

LRB-P-T-1029 - Thermal protection subsystems can cause or be jeopardized by wear during splashdown events occuring at impact (disposable for expendables). -- TPS is not expected to be subject to wear except by aerodynamic environments for which it will be designed. (5 2 88)

LRB-P-T-1031 - Thermal protection subsystems can cause or be jeopardized by wear during recovery activities, including towing, and retrieval of recoverables. -- TPS is not expected to be subject to wear except by aerodynamic environments for which it will be designed. (5 2 88)

LRB-P-T-1032 - Thermal protection subsystems can cause or be jeopardized by wear during refurbishment of reusable components. -- TPS is not expected to be subject to wear except by aerodynamic environments for which it will be designed. (5 2 88)

LRB-P-T-1034 - Thermal protection subsystems can cause or be jeopardized by emergencies during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (5 2 88)

LRB-P-T-1035 - Thermal protection subsystems can cause or be jeopardized by emergencies during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (5 2 88)

LRB-P-T-1036 - Thermal protection subsystems can cause or be jeopardized by emergencies during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (5 2 88)

LRB-P-T-1037 - Thermal protection subsystems can cause or be jeopardized by emergencies during acceptance test and checkout prior to delivery to the Government. -- At the current state of maturity, this hazard cannot be evaluated. (5 2 88)

LRB-P-T-1038 - Thermal protection subsystems can cause or be jeopardized by emergencies during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (5 2 88)

LRB-P-T-1039 - Thermal protection subsystems can cause or be jeopardized by emergencies during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (5 2 88)

LRB-P-T-1040 - Thermal protection subsystems can cause or be jeopardized by emergencies during preparation for shipment of the booster and ship loose hardware. -- At the current state of maturity, this hazard cannot be evaluated. (5 2 88)

LRB-P-T-1041 - Thermal protection subsystems can cause or be jeopardized by emergencies during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (5 2 88)

LRB-P-T-1042 - Thermal protection subsystems can cause or be jeopardized by emergencies during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (5 2 88)

LRB-P-T-1043 - Thermal protection subsystems can cause or be jeopardized by emergencies during preflight checkout prior to stacking. -- At the current state of maturity, this hazard cannot be evaluated. (5 2 88)

LRB-P-T-1044 - Thermal protection subsystems can cause or be jeopardized by emergencies during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (5 2 88)

LRB-P-T-1045 - Thermal protection subsystems can cause or be jeopardized by emergencies during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (5 2 88)

LRB-P-T-1046 - Thermal protection subsystems can cause or be jeopardized by emergencies during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (5 2 88)

LRB-P-T-1047 - Thermal protection subsystems can cause or be jeopardized by emergencies during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (5 2 88)

LRB-P-T-1048 - Thermal protection subsystems can cause or be jeopardized by emergencies during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (5 2 88)

LRB-P-T-1049 - Thermal protection subsystems can cause or be jeopardized by

emergencies during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (5 2 88)

LRB-P-T-1050 - Thermal protection subsystems can cause or be jeopardized by emergencies during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (5 2 88)

LRB-P-T-1051 - Thermal protection subsystems can cause or be jeopardized by emergencies during separation of the LRB from the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (5 2 88)

LRB-P-T-1052 - Thermal protection subsystems can cause or be jeopardized by emergencies during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (5 2 88)

LRB-P-T-1053 - Thermal protection subsystems can cause or be jeopardized by emergencies during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (5 2 88)

LRB-P-T-1054 - Thermal protection subsystems can cause or be jeopardized by emergencies during floatation (of recoverable boosters) until recovery. -- At the current state of maturity, this hazard cannot be evaluated. (5 2 88)

LRB-P-T-1055 - Thermal protection subsystems can cause or be jeopardized by emergencies during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (5 2 88)

LRB-P-T-1056 - Thermal protection subsystems can cause or be jeopardized by emergencies during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (5 2 88)

THESE HAZARDS WERE CONSIDERED BY THE ANALYST BUT WERE NOT FURTHER ANALYZED FOR THE REASONS GIVEN

LRB-P-U-531 - The environment or the public can cause or be jeopardized by hazardous environments during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-532 - The environment or the public can cause or be jeopardized by hazardous environments during proof test of pressure vessels and structure. -- It is expected that adequate precautions will be taken to protect the public in the design of testing facilities. (5 4 88)

LRB-P-U-535 - The environment or the public can cause or be jeopardized by hazardous environments during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as U-534. (5 4 88)

LRB-P-U-537 - The environment or the public can cause or be jeopardized by hazardous environments during transportation from manufacture to launch site or after recovery. -- This hazard is analyzed as P-1041 (5 4 88)

LRB-P-U-538 - The environment or the public can cause or be jeopardized by hazardous environments during storage, including storage of major components. -- This hazard is not credible. (5 4 88)

LRB-P-U-540 - The environment or the public can cause or be jeopardized by hazardous environments during vehicle stacking, including ancillary test activities. -- It is expected that adequate precautions will be taken to protect the public in the design of testing facilities. (5 4 88)

LRB-P-U-541 - The environment or the public can cause or be jeopardized by hazardous environments during rollout from the VAB and preloading preparation. -- This hazard is not credible. (5 4 88)

LRB-P-U-542 - The environment or the public can cause or be jeopardized by hazardous environments during propellant loading for test or flight. -- The configuration of the launch complex appears to provide adequate protection for the public for any launch site contingency. (5 4 88)

LRB-P-U-543 - The environment or the public can cause or be jeopardized by hazardous environments during countdown to liftoff or abort. -- The configuration of the launch complex appears to provide adequate protection to the public for any launch site contingency. (5 4 88)

LRB-P-U-544 - The environment or the public can cause or be jeopardized by hazardous environments during launch abort activities, including mission postponement (scrub). -- The configuration of the launch complex appears to provide

adequate protection to the public for any launch site contingency. (5 4 88)

LRB-P-U-545 - The environment or the public can cause or be jeopardized by hazardous environments during nominal flight from liftoff to LRB burnout. -- The configuration of the launch complex appears to provide adequate protection to the public for any launch site contingency. (5 4 88)

LRB-P-U-546 - The environment or the public can cause or be jeopardized by hazardous environments during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard appears to be controlled by a means of vehicle destruction. (5 4 88)

LRB-P-U-548 - The environment or the public can cause or be jeopardized by hazardous environments during descent from separation to ocean impact. -- This hazard appears to be adequately controlled by designation of the impact area. (5 4 88)

LRB-P-U-549 - The environment or the public can cause or be jeopardized by hazardous environments during splashdown events occuring at impact (disposable for expendables). -- This hazard appears to be adequately controlled by designation of the impact area. (5 4 88)

LRB-P-U-550 - The environment or the public can cause or be jeopardized by hazardous environments during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (5 4 88)

LRB-P-U-551 - The environment or the public can cause or be jeopardized by hazardous environments during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (5 4 88)

LRB-P-U-552 - The environment or the public can cause or be jeopardized by hazardous environments during refurbishment of reusable components. -- This hazard is analyzed as U-530. (5 4 88)

LRB-P-U-554 - The environment or the public can cause or be jeopardized by worker overload during manufacture and fabrication of subsystems and components. -- This hazard is not credible. (5 4 88)

LRB-P-U-555 - The environment or the public can cause or be jeopardized by worker overload during inspection and test of the LRB and subsystems. -- This hazard is not credible. (5 4 88)

LRB-P-U-556 - The environment or the public can cause or be jeopardized by worker overload during proof test of pressure vessels and structure. -- This hazard is not credible. (5 4 88)

LRB-P-U-558 - The environment or the public can cause or be jeopardized by

worker overload during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-559 - The environment or the public can cause or be jeopardized by worker overload during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-561 - The environment or the public can cause or be jeopardized by worker overload during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (5 4 88)

LRB-P-U-562 - The environment or the public can cause or be jeopardized by worker overload during storage, including storage of major components. -- This hazard is not credible. (5 4 88)

LRB-P-U-564 - The environment or the public can cause or be jeopardized by worker overload during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (5 4 88)

LRB-P-U-565 - The environment or the public can cause or be jeopardized by worker overload during rollout from the VAB and preloading preparation. -- This hazard is not credible. (5 4 88)

LRB-P-U-566 - The environment or the public can cause or be jeopardized by worker overload during propellant loading for test or flight. -- The configuration of the launch complex appears to provide adequate protection to the public for any launch site contingency. (5 4 88)

LRB-P-U-567 - The environment or the public can cause or be jeopardized by worker overload during countdown to liftoff or abort. -- This hazard is not credible. (5 4 88)

LRB-P-U-568 - The environment or the public can cause or be jeopardized by worker overload during launch abort activities, including mission postponement (scrub). -- The configuration of the launch complex appears to provide adequate protection to the public for any launch site contingency. (5 4 88)

LRB-P-U-574 - The environment or the public can cause or be jeopardized by worker overload during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (5 4 88)

LRB-P-U-575 - The environment or the public can cause or be jeopardized by worker overload during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-576 - The environment or the public can cause or be jeopardized by worker overload during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-578 - The environment or the public can cause or be jeopardized by unsafe or unhygienic working conditions during manufacture and fabrication of subsystems and components. -- This hazard is not credible. (5 4 88)

LRB-P-U-579 - The environment or the public can cause or be jeopardized by unsafe or unhygienic working conditions during inspection and test of the LRB and subsystems. -- This hazard is not credible. (5 4 88)

LRB-P-U-580 - The environment or the public can cause or be jeopardized by unsafe or unhygienic working conditions during proof test of pressure vessels and structure. -- This hazard is not credible. (5 4 88)

LRB-P-U-582 - The environment or the public can cause or be jeopardized by unsafe or unhygienic working conditions during test firing of engines and/or the completed booster. -- This hazard is not credible. (5 4 88)

LRB-P-U-583 - The environment or the public can cause or be jeopardized by unsafe or unhygienic working conditions during flight readiness firing (FRF) of the STS vehicle. -- This hazard is not credible. (5 4 88)

LRB-P-U-585 - The environment or the public can cause or be jeopardized by unsafe or unhygienic working conditions during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (5 4 88)

LRB-P-U-586 - The environment or the public can cause or be jeopardized by unsafe or unhygienic working conditions during storage, including storage of major components. -- This hazard is not credible. (5 4 88)

LRB-P-U-588 - The environment or the public can cause or be jeopardized by unsafe or unhygienic working conditions during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (5 4 88)

LRB-P-U-589 - The environment or the public can cause or be jeopardized by unsafe or unhygienic working conditions during rollout from the VAB and preloading preparation. -- This hazard is not credible. (5 4 88)

LRB-P-U-590 - The environment or the public can cause or be jeopardized by unsafe or unhygienic working conditions during propellant loading for test or flight. -- This hazard is not credible. (5 4 88)

LRB-P-U-591 - The environment or the public can cause or be jeopardized by unsafe or unhygienic working conditions during countdown to liftoff or abort. -- This

hazard is not credible. (5 4 88)

LRB-P-U-592 - The environment or the public can cause or be jeopardized by unsafe or unhygienic working conditions during launch abort activities, including mission postponement (scrub). -- This hazard is not credible. (5 4 88)

LRB-P-U-598 - The environment or the public can cause or be jeopardized by unsafe or unhygienic working conditions during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (5 4 88)

LRB-P-U-599 - The environment or the public can cause or be jeopardized by unsafe or unhygienic working conditions during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (5 4 88)

LRB-P-U-600 - The environment or the public can cause or be jeopardized by unsafe or unhygienic working conditions during refurbishment of reusable components. -- This hazard is not credible. (5 4 88)

LRB-P-U-633 - The environment or the public can cause or be jeopardized by wind during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-637 - The environment or the public can cause or be jeopardized by wind during rollout from the VAB and preloading preparation. -- The configuration of the launch complex appears to provide adequate protection to the public for any launch site contingency. (5 4 88)

LRB-P-U-638 - The environment or the public can cause or be jeopardized by wind during propellant loading for test or flight. -- The configuration of the launch complex appears to provide adequate protection to the public for any launch site contingency. (5 4 88)

LRB-P-U-639 - The environment or the public can cause or be jeopardized by wind during countdown to liftoff or abort. -- The configuration of the launch complex appears to provide adequate protection to the public for any launch site contingency. (5 4 88)

LRB-P-U-640 - The environment or the public can cause or be jeopardized by wind during launch abort activities, including mission postponement (scrub). -- The configuration of the launch complex appears to provide adequate protection to the public for any launch site contingency. (5 4 88)

LRB-P-U-641 - The environment or the public can cause or be jeopardized by wind during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-642 - The environment or the public can cause or be jeopardized by wind during intact abort, including RTLS, TAL, AOA and ATO. -- This may be a hazard with regard to the Orbiter in gusty landing conditions, but it does not appear to be an LRB hazard. (5 4 88)

LRB-P-U-644 - The environment or the public can cause or be jeopardized by wind during descent from separation to ocean impact. -- It is expected that the designated dispersal area will be large enough that dispersions about the impact point due to wind will not jeopardize public safety. (5 4 88)

LRB-P-U-645 - The environment or the public can cause or be jeopardized by wind during splashdown events occuring at impact (disposable for expendables). -- See the comment for U-644. (5 4 88)

LRB-P-U-646 - The environment or the public can cause or be jeopardized by wind during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (5 4 88)

LRB-P-U-647 - The environment or the public can cause or be jeopardized by wind during recovery activities, including towing, and retrieval of recoverables. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-648 - The environment or the public can cause or be jeopardized by wind during refurbishment of reusable components. -- This hazard is not credible. (5 4 88)

LRB-P-U-650 - The environment or the public can cause or be jeopardized by contamination during manufacture and fabrication of subsystems and components. -- This hazard is analyzed as S-578. (5 4 88)

LRB-P-U-651 - The environment or the public can cause or be jeopardized by contamination during inspection and test of the LRB and subsystems. -- This hazard is not credible. (5 4 88)

LRB-P-U-652 - The environment or the public can cause or be jeopardized by contamination during proof test of pressure vessels and structure. -- This hazard is not credible. (5 4 88)

LRB-P-U-654 - The environment or the public can cause or be jeopardized by contamination during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-655 - The environment or the public can cause or be jeopardized by contamination during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-657 - The environment or the public can cause or be jeopardized by

contamination during transportation from manufacture to launch site or after recovery. -- This hazard is analyzed as P-1041. (5 4 88)

LRB-P-U-658 - The environment or the public can cause or be jeopardized by contamination during storage, including storage of major components. -- This hazard is not credible. (5 4 88)

LRB-P-U-660 - The environment or the public can cause or be jeopardized by contamination during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (5 4 88)

LRB-P-U-661 - The environment or the public can cause or be jeopardized by contamination during rollout from the VAB and preloading preparation. -- This hazard is not credible. (5 4 88)

LRB-P-U-662 - The environment or the public can cause or be jeopardized by contamination during propellant loading for test or flight. -- This hazard is not credible. (5 4 88)

LRB-P-U-663 - The environment or the public can cause or be jeopardized by contamination during countdown to liftoff or abort. -- This hazard is not credible. (5 4 88)

LRB-P-U-664 - The environment or the public can cause or be jeopardized by contamination during launch abort activities, including mission postponement (scrub). -- This hazard is not credible. (5 4 88)

LRB-P-U-665 - The environment or the public can cause or be jeopardized by contamination during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (5 4 88)

LRB-P-U-666 - The environment or the public can cause or be jeopardized by contamination during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (5 4 88)

LRB-P-U-668 - The environment or the public can cause or be jeopardized by contamination during descent from separation to ocean impact. -- This hazard is not credible. (5 4 88)

LRB-P-U-669 - The environment or the public can cause or be jeopardized by contamination during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (5 4 88)

LRB-P-U-670 - The environment or the public can cause or be jeopardized by contamination during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (5 4 88)

LRB-P-U-671 - The environment or the public can cause or be jeopardized by contamination during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (5 4 88)

LRB-P-U-672 - The environment or the public can cause or be jeopardized by contamination during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-678 - The environment or the public can cause or be jeopardized by heat sources during test firing of engines and/or the completed booster. -- This hazard is analyzed as U-534. (5 4 88)

LRB-P-U-679 - The environment or the public can cause or be jeopardized by heat sources during flight readiness firing (FRF) of the STS vehicle. -- This hazard is analyzed as U-534. (5 4 88)

LRB-P-U-681 - The environment or the public can cause or be jeopardized by heat sources during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (5 4 88)

LRB-P-U-682 - The environment or the public can cause or be jeopardized by heat sources during storage, including storage of major components. -- This hazard is not credible. (5 4 88)

LRB-P-U-685 - The environment or the public can cause or be jeopardized by heat sources during rollout from the VAB and preloading preparation. -- This hazard is not credible. (5 4 88)

LRB-P-U-686 - The environment or the public can cause or be jeopardized by heat sources during propellant loading for test or flight. -- This hazard is not credible. (5 4 88)

LRB-P-U-687 - The environment or the public can cause or be jeopardized by heat sources during countdown to liftoff or abort. -- This hazard is not credible. (5 4 88)

LRB-P-U-688 - The environment or the public can cause or be jeopardized by heat sources during launch abort activities, including mission postponement (scrub). -- This hazard is not credible. (5 4 88)

LRB-P-U-689 - The environment or the public can cause or be jeopardized by heat sources during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (5 4 88)

LRB-P-U-690 - The environment or the public can cause or be jeopardized by heat sources during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (5 4 88)

LRB-P-U-692 - The environment or the public can cause or be jeopardized by heat sources during descent from separation to ocean impact. -- This hazard is not credible. (5 4 88)

LRB-P-U-724 - The environment or the public can cause or be jeopardized by moisture or precipitation during proof test of pressure vessels and structure. -- This hazard is not credible. (5 4 88)

LRB-P-U-726 - The environment or the public can cause or be jeopardized by moisture or precipitation during test firing of engines and/or the completed booster. -- This hazard is analyzed as U-534. (5 4 88)

LRB-P-U-727 - The environment or the public can cause or be jeopardized by moisture or precipitation during flight readiness firing (FRF) of the STS vehicle. -- This hazard is not credible. (5 4 88)

LRB-P-U-729 - The environment or the public can cause or be jeopardized by moisture or precipitation during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (5 4 88)

LRB-P-U-730 - The environment or the public can cause or be jeopardized by moisture or precipitation during storage, including storage of major components. -- This hazard is not credible. (5 4 88)

LRB-P-U-732 - The environment or the public can cause or be jeopardized by moisture or precipitation during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (5 4 88)

LRB-P-U-733 - The environment or the public can cause or be jeopardized by moisture or precipitation during rollout from the VAB and preloading preparation. -- This hazard is not credible. (5 4 88)

LRB-P-U-734 - The environment or the public can cause or be jeopardized by moisture or precipitation during propellant loading for test or flight. -- This hazard is not credible. (5 4 88)

LRB-P-U-735 - The environment or the public can cause or be jeopardized by moisture or precipitation during countdown to liftoff or abort. -- This hazard is not credible. (5 4 88)

LRB-P-U-736 - The environment or the public can cause or be jeopardized by moisture or precipitation during launch abort activities, including mission postponement (scrub). -- This hazard is not credible. (5 4 88)

LRB-P-U-737 - The environment or the public can cause or be jeopardized by moisture or precipitation during nominal flight from liftoff to LRB burnout. -- The

possibility of generation of acid rain analyzed in U-534 is minimized at the launch site due to the large restricted area around the launch site and the comgination of prevailing winds and the large seaward dispersal area. (5 4 88)

LRB-P-U-738 - The environment or the public can cause or be jeopardized by moisture or precipitation during intact abort, including RTLS, TAL, AOA and ATO. -- See the comment for U-737. (5 4 88)

LRB-P-U-740 - The environment or the public can cause or be jeopardized by moisture or precipitation during descent from separation to ocean impact. -- This hazard is not credible. (5 4 88)

LRB-P-U-741 - The environment or the public can cause or be jeopardized by moisture or precipitation during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (5 4 88)

LRB-P-U-742 - The environment or the public can cause or be jeopardized by moisture or precipitation during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (5 4 88)

LRB-P-U-743 - The environment or the public can cause or be jeopardized by moisture or precipitation during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (5 4 88)

LRB-P-U-744 - The environment or the public can cause or be jeopardized by moisture or precipitation during refurbishment of reusable components. -- This hazard is not credible. (5 4 88)

LRB-P-U-746 - The environment or the public can cause or be jeopardized by electrical system malfunction during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-747 - The environment or the public can cause or be jeopardized by electrical system malfunction during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-748 - The environment or the public can cause or be jeopardized by electrical system malfunction during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-750 - The environment or the public can cause or be jeopardized by electrical system malfunction during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-751 - The environment or the public can cause or be jeopardized by

electrical system malfunction during flight readiness firing (FRF) of the STS vehicle. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-753 - The environment or the public can cause or be jeopardized by electrical system malfunction during transportation from manufacture to launch site or after recovery. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-754 - The environment or the public can cause or be jeopardized by electrical system malfunction during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-756 - The environment or the public can cause or be jeopardized by electrical system malfunction during vehicle stacking, including ancillary test activities. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-757 - The environment or the public can cause or be jeopardized by electrical system malfunction during rollout from the VAB and preloading preparation. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-758 - The environment or the public can cause or be jeopardized by electrical system malfunction during propellant loading for test or flight. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-759 - The environment or the public can cause or be jeopardized by electrical system malfunction during countdown to liftoff or abort. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-760 - The environment or the public can cause or be jeopardized by electrical system malfunction during launch abort activities, including mission postponement (scrub). -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-761 - The environment or the public can cause or be jeopardized by electrical system malfunction during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-762 - The environment or the public can cause or be jeopardized by electrical system malfunction during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-764 - The environment or the public can cause or be jeopardized by electrical system malfunction during descent from separation to ocean impact. -- This hazard is not credible. (5 4 88)

LRB-P-U-765 - The environment or the public can cause or be jeopardized by

electrical system malfunction during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (5 4 88)

LRB-P-U-766 - The environment or the public can cause or be jeopardized by electrical system malfunction during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (5 4 88)

LRB-P-U-767 - The environment or the public can cause or be jeopardized by electrical system malfunction during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (5 4 88)

LRB-P-U-768 - The environment or the public can cause or be jeopardized by electrical system malfunction during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-772 - The environment or the public can cause or be jeopardized by differential pressure during proof test of pressure vessels and structure. -- This hazard is not credible. (5 4 88)

LRB-P-U-774 - The environment or the public can cause or be jeopardized by differential pressure during test firing of engines and/or the completed booster. -- This hazard is not credible. (5 4 88)

LRB-P-U-775 - The environment or the public can cause or be jeopardized by differential pressure during flight readiness firing (FRF) of the STS vehicle. -- This hazard is not credible. (5 4 88)

LRB-P-U-777 - The environment or the public can cause or be jeopardized by differential pressure during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (5 4 88)

LRB-P-U-778 - The environment or the public can cause or be jeopardized by differential pressure during storage, including storage of major components. -- This hazard is not credible. (5 4 88)

LRB-P-U-782 - The environment or the public can cause or be jeopardized by differential pressure during propellant loading for test or flight. -- This hazard is not credible. (5 4 88)

LRB-P-U-783 - The environment or the public can cause or be jeopardized by differential pressure during countdown to liftoff or abort. -- This hazard is not credible. (5 4 88)

LRB-P-U-784 - The environment or the public can cause or be jeopardized by differential pressure during launch abort activities, including mission postponement (scrub). -- This hazard is not credible. (5 4 88)

LRB-P-U-785 - The environment or the public can cause or be jeopardized by differential pressure during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (5 4 88)

LRB-P-U-786 - The environment or the public can cause or be jeopardized by differential pressure during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (5 4 88)

LRB-P-U-788 - The environment or the public can cause or be jeopardized by differential pressure during descent from separation to ocean impact. -- This hazard is not credible. (5 4 88)

LRB-P-U-789 - The environment or the public can cause or be jeopardized by differential pressure during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (5 4 88)

LRB-P-U-790 - The environment or the public can cause or be jeopardized by differential pressure during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (5 4 88)

LRB-P-U-791 - The environment or the public can cause or be jeopardized by differential pressure during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (5 4 88)

LRB-P-U-798 - The environment or the public can cause or be jeopardized by vibration, acoustic loads or shock during test firing of engines and/or the completed booster. -- It is assumed that testing facilities will be sufficiently removed from areas where the public could be jeopardized that this hazard is not a concern. (5 4 88)

LRB-P-U-799 - The environment or the public can cause or be jeopardized by vibration, acoustic loads or shock during flight readiness firing (FRF) of the STS vehicle. -- This hazard is not credible. (5 4 88)

LRB-P-U-801 - The environment or the public can cause or be jeopardized by vibration, acoustic loads or shock during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (5 4 88)

LRB-P-U-808 - The environment or the public can cause or be jeopardized by vibration, acoustic loads or shock during launch abort activities, including mission postponement (scrub). -- This hazard is not credible. (5 4 88)

LRB-P-U-809 - The environment or the public can cause or be jeopardized by vibration, acoustic loads or shock during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (5 4 88)

LRB-P-U-810 - The environment or the public can cause or be jeopardized by

vibration, acoustic loads or shock during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (5 4 88)

LRB-P-U-812 - The environment or the public can cause or be jeopardized by vibration, acoustic loads or shock during descent from separation to ocean impact. -- This hazard is not credible. (5 4 88)

LRB-P-U-813 - The environment or the public can cause or be jeopardized by vibration, acoustic loads or shock during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (5 4 88)

LRB-P-U-815 - The environment or the public can cause or be jeopardized by vibration, acoustic loads or shock during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (5 4 88)

LRB-P-U-843 - The environment or the public can cause or be jeopardized by leaks during inspection and test of the LRB and subsystems. -- This hazard is not credible. (5 4 88)

LRB-P-U-844 - The environment or the public can cause or be jeopardized by leaks during proof test of pressure vessels and structure. -- This hazard is not credible. (5 4 88)

LRB-P-U-846 - The environment or the public can cause or be jeopardized by leaks during test firing of engines and/or the completed booster. -- This hazard is not credible. (5 4 88)

LRB-P-U-847 - The environment or the public can cause or be jeopardized by leaks during flight readiness firing (FRF) of the STS vehicle. -- This hazard is not credible. (5 4 88)

LRB-P-U-849 - The environment or the public can cause or be jeopardized by leaks during transportation from manufacture to launch site or after recovery. -- Neither of the propellants is, by itself, sufficiently hazardous that this hazard is any more severe than those associated with transportation of other cryogens or liquid fuels. (5 4 88)

LRB-P-U-850 - The environment or the public can cause or be jeopardized by leaks during storage, including storage of major components. -- This hazard is not credible. (5 4 88)

LRB-P-U-852 - The environment or the public can cause or be jeopardized by leaks during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (5 4 88)

LRB-P-U-853 - The environment or the public can cause or be jeopardized by leaks during rollout from the VAB and preloading preparation. -- This hazard is not credible. (5 4 88)

LRB-P-U-854 - The environment or the public can cause or be jeopardized by leaks during propellant loading for test or flight. -- This hazard is not credible. (5 4 88)

LRB-P-U-855 - The environment or the public can cause or be jeopardized by leaks during countdown to liftoff or abort. -- This hazard is not credible. (5 4 88)

LRB-P-U-856 - The environment or the public can cause or be jeopardized by leaks during launch abort activities, including mission postponement (scrub). -- This hazard is not credible. (5 4 88)

LRB-P-U-857 - The environment or the public can cause or be jeopardized by leaks during nominal flight from liftoff to LRB burnout. -- Neither LOX nor RP-1 is a significant pollutant. (5 4 88)

LRB-P-U-858 - The environment or the public can cause or be jeopardized by leaks during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (5 4 88)

LRB-P-U-860 - The environment or the public can cause or be jeopardized by leaks during descent from separation to ocean impact. -- This hazard is not credible. (5 4 88)

LRB-P-U-861 - The environment or the public can cause or be jeopardized by leaks during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (5 4 88)

LRB-P-U-862 - The environment or the public can cause or be jeopardized by leaks during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (5 4 88)

LRB-P-U-863 - The environment or the public can cause or be jeopardized by leaks during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (5 4 88)

LRB-P-U-864 - The environment or the public can cause or be jeopardized by leaks during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be analyzed. (5 4 88)

LRB-P-U-870 - The environment or the public can cause or be jeopardized by propellant characteristics and products during test firing of engines and/or the completed booster. -- Products of combustion of LOX and RP-1 are relatively innocuous. However, see U-534. (5 4 88)

LRB-P-U-871 - The environment or the public can cause or be jeopardized by propellant characteristics and products during flight readiness firing (FRF) of the STS

vehicle. -- The configuration of the launch facility appears to provide sufficient protection. (5 4 88)

LRB-P-U-873 - The environment or the public can cause or be jeopardized by propellant characteristics and products during transportation from manufacture to launch site or after recovery. -- This hazard is analyzed as P-1041. (5 4 88)

LRB-P-U-874 - The environment or the public can cause or be jeopardized by propellant characteristics and products during storage, including storage of major components. -- This hazard is not credible. (5 4 88)

LRB-P-U-877 - The environment or the public can cause or be jeopardized by propellant characteristics and products during rollout from the VAB and preloading preparation. -- This hazard is not credible. (5 4 88)

LRB-P-U-878 - The environment or the public can cause or be jeopardized by propellant characteristics and products during propellant loading for test or flight. -- The configuration of the launch facility appears to provide sufficient protection. (5 4 88)

LRB-P-U-879 - The environment or the public can cause or be jeopardized by propellant characteristics and products during countdown to liftoff or abort. -- The configuration of the launch facility appears to provide sufficient protection. (5 4 88)

LRB-P-U-880 - The environment or the public can cause or be jeopardized by propellant characteristics and products during launch abort activities, including mission postponement (scrub). -- The configuration of the launch facility appears to provide sufficient protection. (5 4 88)

LRB-P-U-881 - The environment or the public can cause or be jeopardized by propellant characteristics and products during nominal flight from liftoff to LRB burnout. -- The configuration of the launch facility appears to provide sufficient protection. (5 4 88)

LRB-P-U-882 - The environment or the public can cause or be jeopardized by propellant characteristics and products during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (5 4 88)

LRB-P-U-884 - The environment or the public can cause or be jeopardized by propellant characteristics and products during descent from separation to ocean impact. -- This hazard is not credible. (5 4 88)

LRB-P-U-885 - The environment or the public can cause or be jeopardized by propellant characteristics and products during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (5 4 88)

LRB-P-U-886 - The environment or the public can cause or be jeopardized by propellant characteristics and products during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (5 4 88)

LRB-P-U-887 - The environment or the public can cause or be jeopardized by propellant characteristics and products during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (5 4 88)

LRB-P-U-888 - The environment or the public can cause or be jeopardized by propellant characteristics and products during refurbishment of reusable components. -- This hazard is not credible. (5 4 88)

LRB-P-U-894 - The environment or the public can cause or be jeopardized by lightning or electromagnetic discharge during test firing of engines and/or the completed booster. -- Even if the booster or STS vehicle is destroyed by lightning, this does not appear to be an environmental or public hazard. (5 4 88)

LRB-P-U-895 - The environment or the public can cause or be jeopardized by lightning or electromagnetic discharge during flight readiness firing (FRF) of the STS vehicle. -- Even if the booster or STS vehicle is destroyed by lightning, this does not appear to be an environmental or public hazard. (5 4 88)

LRB-P-U-897 - The environment or the public can cause or be jeopardized by lightning or electromagnetic discharge during transportation from manufacture to launch site or after recovery. -- Even if the booster or STS vehicle is destroyed by lightning, this does not appear to be an environmental or public hazard. (5 4 88)

LRB-P-U-898 - The environment or the public can cause or be jeopardized by lightning or electromagnetic discharge during storage, including storage of major components. -- Even if the booster or STS vehicle is destroyed by lightning, this does not appear to be an environmental or public hazard. (5 4 88)

LRB-P-U-901 - The environment or the public can cause or be jeopardized by lightning or electromagnetic discharge during rollout from the VAB and preloading preparation. -- Even if the booster or STS vehicle is destroyed by lightning, this does not appear to be an environmental or public hazard. (5 4 88)

LRB-P-U-902 - The environment or the public can cause or be jeopardized by lightning or electromagnetic discharge during propellant loading for test or flight. -- Even if the booster or STS vehicle is destroyed by lightning, this does not appear to be an environmental or public hazard. (5 4 88)

LRB-P-U-903 - The environment or the public can cause or be jeopardized by lightning or electromagnetic discharge during countdown to liftoff or abort. -- Even if the booster or STS vehicle is destroyed by lightning, this does not appear to be an environmental or public hazard. (5 4 88)

LRB-P-U-904 - The environment or the public can cause or be jeopardized by lightning or electromagnetic discharge during launch abort activities, including mission postponement (scrub). -- Even if the booster or STS vehicle is destroyed by lightning, this does not appear to be an environmental or public hazard. (5 4 88)

LRB-P-U-905 - The environment or the public can cause or be jeopardized by lightning or electromagnetic discharge during nominal flight from liftoff to LRB burnout. -- Even if the booster or STS vehicle is destroyed by lightning, this does not appear to be an environmental or public hazard. (5 4 88)

LRB-P-U-906 - The environment or the public can cause or be jeopardized by lightning or electromagnetic discharge during intact abort, including RTLS, TAL, AOA and ATO. -- Even if the booster or STS vehicle is destroyed by lightning, this does not appear to be an environmental or public hazard. (5 4 88)

LRB-P-U-908 - The environment or the public can cause or be jeopardized by lightning or electromagnetic discharge during descent from separation to ocean impact. -- Even if the booster or STS vehicle is destroyed by lightning, this does not appear to be an environmental or public hazard. (5 4 88)

LRB-P-U-909 - The environment or the public can cause or be jeopardized by lightning or electromagnetic discharge during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (5 4 88)

LRB-P-U-910 - The environment or the public can cause or be jeopardized by lightning or electromagnetic discharge during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (5 4 88)

LRB-P-U-911 - The environment or the public can cause or be jeopardized by lightning or electromagnetic discharge during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (5 4 88)

LRB-P-U-938 - The environment or the public can cause or be jeopardized by chemical activity during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-939 - The environment or the public can cause or be jeopardized by chemical activity during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-940 - The environment or the public can cause or be jeopardized by chemical activity during proof test of pressure vessels and structure. -- This hazard is not credible. (5 4 88)

LRB-P-U-942 - The environment or the public can cause or be jeopardized by chemical activity during test firing of engines and/or the completed booster. -- This

hazard is analyzed as U-534. (5 4 88)

LRB-P-U-943 - The environment or the public can cause or be jeopardized by chemical activity during flight readiness firing (FRF) of the STS vehicle. -- The configuration of the launch facility appears to control this hazard. (5 4 88)

LRB-P-U-945 - The environment or the public can cause or be jeopardized by chemical activity during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (5 4 88)

LRB-P-U-946 - The environment or the public can cause or be jeopardized by chemical activity during storage, including storage of major components. -- This hazard is not credible. (5 4 88)

LRB-P-U-948 - The environment or the public can cause or be jeopardized by chemical activity during vehicle stacking, including ancillary test activities. -- This hazard is not credible. (5 4 88)

LRB-P-U-949 - The environment or the public can cause or be jeopardized by chemical activity during rollout from the VAB and preloading preparation. -- This hazard is not credible. (5 4 88)

LRB-P-U-950 - The environment or the public can cause or be jeopardized by chemical activity during propellant loading for test or flight. -- The configuration of the launch facility appears to control this hazard. (5 4 88)

LRB-P-U-951 - The environment or the public can cause or be jeopardized by chemical activity during countdown to liftoff or abort. -- The configuration of the launch facility appears to control this hazard. (5 4 88)

LRB-P-U-952 - The environment or the public can cause or be jeopardized by chemical activity during launch abort activities, including mission postponement (scrub). -- The configuration of the launch facility appears to control this hazard. (5 4 88)

LRB-P-U-953 - The environment or the public can cause or be jeopardized by chemical activity during nominal flight from liftoff to LRB burnout. -- The configuration of the launch facility appears to control this hazard. (5 4 88)

LRB-P-U-954 - The environment or the public can cause or be jeopardized by chemical activity during intact abort, including RTLS, TAL, AOA and ATO. -- This hazard is not credible. (5 4 88)

LRB-P-U-956 - The environment or the public can cause or be jeopardized by chemical activity during descent from separation to ocean impact. -- This hazard is not credible. (5 4 88)

LRB-P-U-957 - The environment or the public can cause or be jeopardized by chemical activity during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (5 4 88)

LRB-P-U-958 - The environment or the public can cause or be jeopardized by chemical activity during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (5 4 88)

LRB-P-U-959 - The environment or the public can cause or be jeopardized by chemical activity during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (5 4 88)

LRB-P-U-960 - The environment or the public can cause or be jeopardized by chemical activity during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-962 - The environment or the public can cause or be jeopardized by computer system malfunction during manufacture and fabrication of subsystems and components. -- This hazard is not credible. (5 4 88)

LRB-P-U-963 - The environment or the public can cause or be jeopardized by computer system malfunction during inspection and test of the LRB and subsystems. -- This hazard is not credible. (5 4 88)

LRB-P-U-964 - The environment or the public can cause or be jeopardized by computer system malfunction during proof test of pressure vessels and structure. -- This hazard is not credible. (5 4 88)

LRB-P-U-966 - The environment or the public can cause or be jeopardized by computer system malfunction during test firing of engines and/or the completed booster. -- This hazard is not credible. (5 4 88)

LRB-P-U-967 - The environment or the public can cause or be jeopardized by computer system malfunction during flight readiness firing (FRF) of the STS vehicle. -- This hazard is not credible. (5 4 88)

LRB-P-U-969 - The environment or the public can cause or be jeopardized by computer system malfunction during transportation from manufacture to launch site or after recovery. -- This hazard is not credible. (5 4 88)

LRB-P-U-970 - The environment or the public can cause or be jeopardized by computer system malfunction during storage, including storage of major components. -- This hazard is not credible. (5 4 88)

LRB-P-U-972 - The environment or the public can cause or be jeopardized by computer system malfunction during vehicle stacking, including ancillary test

activities. -- This hazard is not credible. (5 4 88)

LRB-P-U-973 - The environment or the public can cause or be jeopardized by computer system malfunction during rollout from the VAB and preloading preparation. -- This hazard is not credible. (5 4 88)

LRB-P-U-974 - The environment or the public can cause or be jeopardized by computer system malfunction during propellant loading for test or flight. -- This hazard is not credible. (5 4 88)

LRB-P-U-975 - The environment or the public can cause or be jeopardized by computer system malfunction during countdown to liftoff or abort. -- This hazard is not credible. (5 4 88)

LRB-P-U-976 - The environment or the public can cause or be jeopardized by computer system malfunction during launch abort activities, including mission postponement (scrub). -- This hazard is not credible. (5 4 88)

LRB-P-U-977 - The environment or the public can cause or be jeopardized by computer system malfunction during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (5 4 88)

LRB-P-U-978 - The environment or the public can cause or be jeopardized by computer system malfunction during intact abort, including RTLS, TAL, AOA and ATO. -- A malfunction of a computer system which could cause an unsafe trajectory is a definite hazard. However, this appears to be controlled by a vehicle destruct system. (5 4 88)

LRB-P-U-980 - The environment or the public can cause or be jeopardized by computer system malfunction during descent from separation to ocean impact. -- This hazard is not credible. (5 4 88)

LRB-P-U-981 - The environment or the public can cause or be jeopardized by computer system malfunction during splashdown events occuring at impact (disposable for expendables). -- This hazard is not credible. (5 4 88)

LRB-P-U-982 - The environment or the public can cause or be jeopardized by computer system malfunction during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (5 4 88)

LRB-P-U-983 - The environment or the public can cause or be jeopardized by computer system malfunction during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (5 4 88)

LRB-P-U-984 - The environment or the public can cause or be jeopardized by computer system malfunction during refurbishment of reusable components. -- This

hazard is not credible. (5 4 88)

LRB-P-U-986 - The environment or the public can cause or be jeopardized by operator error during manufacture and fabrication of subsystems and components. -- An operator error which would allow scrap containing lithium to be mixed with other aluminum scrap is analyzed as S-578. (5 4 88)

LRB-P-U-987 - The environment or the public can cause or be jeopardized by operator error during inspection and test of the LRB and subsystems. -- This hazard is not credible. (5 4 88)

LRB-P-U-988 - The environment or the public can cause or be jeopardized by operator error during proof test of pressure vessels and structure. -- This hazard is not credible. (5 4 88)

LRB-P-U-990 - The environment or the public can cause or be jeopardized by operator error during test firing of engines and/or the completed booster. -- This hazard is not credible. (5 4 88)

LRB-P-U-991 - The environment or the public can cause or be jeopardized by operator error during flight readiness firing (FRF) of the STS vehicle. -- The configuration of the launch facility appears to control this hazard. (5 4 88)

LRB-P-U-993 - The environment or the public can cause or be jeopardized by operator error during transportation from manufacture to launch site or after recovery. -- An operator error during transportation of propellants which would jeopardize the public is suggested by this hazard. However, this does not appear to be a hazard which is significantly different from those common in the transportation industry. Its uniqueness with respect to the LRB, if any, cannot be adequately evaluated at this time. (5 4 88)

LRB-P-U-994 - The environment or the public can cause or be jeopardized by operator error during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-996 - The environment or the public can cause or be jeopardized by operator error during vehicle stacking, including ancillary test activities. -- The configuration of the launch facility appears to control this hazard. (5 4 88)

LRB-P-U-997 - The environment or the public can cause or be jeopardized by operator error during rollout from the VAB and preloading preparation. -- The configuration of the launch facility appears to control this hazard. (5 4 88)

LRB-P-U-998 - The environment or the public can cause or be jeopardized by operator error during propellant loading for test or flight. -- The configuration of the launch facility appears to control this hazard. (5 4 88)

LRB-P-U-999 - The environment or the public can cause or be jeopardized by operator error during countdown to liftoff or abort. -- The configuration of the launch facility appears to control this hazard. (5 4 88)

LRB-P-U-1000 - The environment or the public can cause or be jeopardized by operator error during launch abort activities, including mission postponement (scrub). -- The configuration of the launch facility appears to control this hazard. (5 4 88)

LRB-P-U-1001 - The environment or the public can cause or be jeopardized by operator error during nominal flight from liftoff to LRB burnout. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-1002 - The environment or the public can cause or be jeopardized by operator error during intact abort, including RTLS, TAL, AOA and ATO. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-1007 - The environment or the public can cause or be jeopardized by operator error during recovery activities, including towing, and retrieval of recoverables. -- This hazard is not credible. (5 4 88)

LRB-P-U-1008 - The environment or the public can cause or be jeopardized by operator error during refurbishment of reusable components. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-1034 - The environment or the public can cause or be jeopardized by emergencies during manufacture and fabrication of subsystems and components. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-1035 - The environment or the public can cause or be jeopardized by emergencies during inspection and test of the LRB and subsystems. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-1036 - The environment or the public can cause or be jeopardized by emergencies during proof test of pressure vessels and structure. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-1038 - The environment or the public can cause or be jeopardized by emergencies during test firing of engines and/or the completed booster. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-1039 - The environment or the public can cause or be jeopardized by emergencies during flight readiness firing (FRF) of the STS vehicle. -- The configuration of the launch facility appears to control this hazard. (5 4 88)

LRB-P-U-1041 - The environment or the public can cause or be jeopardized by emergencies during transportation from manufacture to launch site or after recovery.

-- This hazard is analyzed as P-1041. (5 4 88)

LRB-P-U-1042 - The environment or the public can cause or be jeopardized by emergencies during storage, including storage of major components. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-1044 - The environment or the public can cause or be jeopardized by emergencies during vehicle stacking, including ancillary test activities. -- The configuration of the launch facility appears to control this hazard. (5 4 88)

LRB-P-U-1045 - The environment or the public can cause or be jeopardized by emergencies during rollout from the VAB and preloading preparation. -- The configuration of the launch facility appears to control this hazard. (5 4 88)

LRB-P-U-1046 - The environment or the public can cause or be jeopardized by emergencies during propellant loading for test or flight. -- The configuration of the launch facility appears to control this hazard. (5 4 88)

LRB-P-U-1047 - The environment or the public can cause or be jeopardized by emergencies during countdown to liftoff or abort. -- The configuration of the launch facility appears to control this hazard. (5 4 88)

LRB-P-U-1048 - The environment or the public can cause or be jeopardized by emergencies during launch abort activities, including mission postponement (scrub). -- The configuration of the launch facility appears to control this hazard. (5 4 88)

LRB-P-U-1049 - The environment or the public can cause or be jeopardized by emergencies during nominal flight from liftoff to LRB burnout. -- This hazard is not credible. (5 4 88)

LRB-P-U-1050 - The environment or the public can cause or be jeopardized by emergencies during intact abort, including RTLS, TAL, AOA and ATO. -- A vehicle destruct capability appears adequately to control this hazard. (5 4 88)

LRB-P-U-1052 - The environment or the public can cause or be jeopardized by emergencies during descent from separation to ocean impact. -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-1053 - The environment or the public can cause or be jeopardized by emergencies during splashdown events occuring at impact (disposable for expendables). -- At the current state of maturity, this hazard cannot be evaluated. (5 4 88)

LRB-P-U-1054 - The environment or the public can cause or be jeopardized by emergencies during floatation (of recoverable boosters) until recovery. -- This hazard is not credible. (5 4 88)